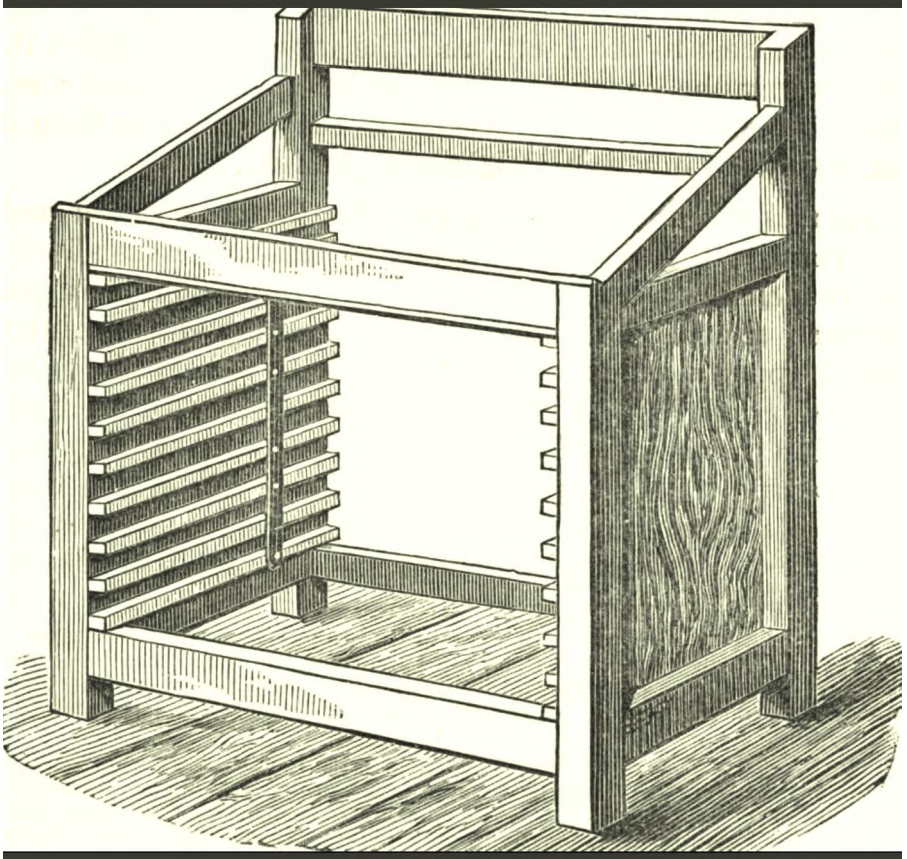

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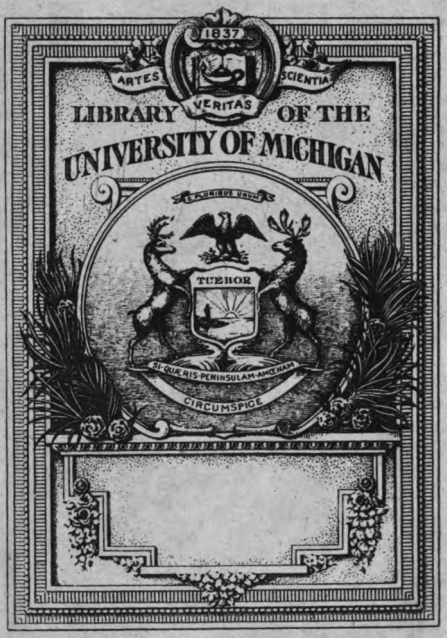

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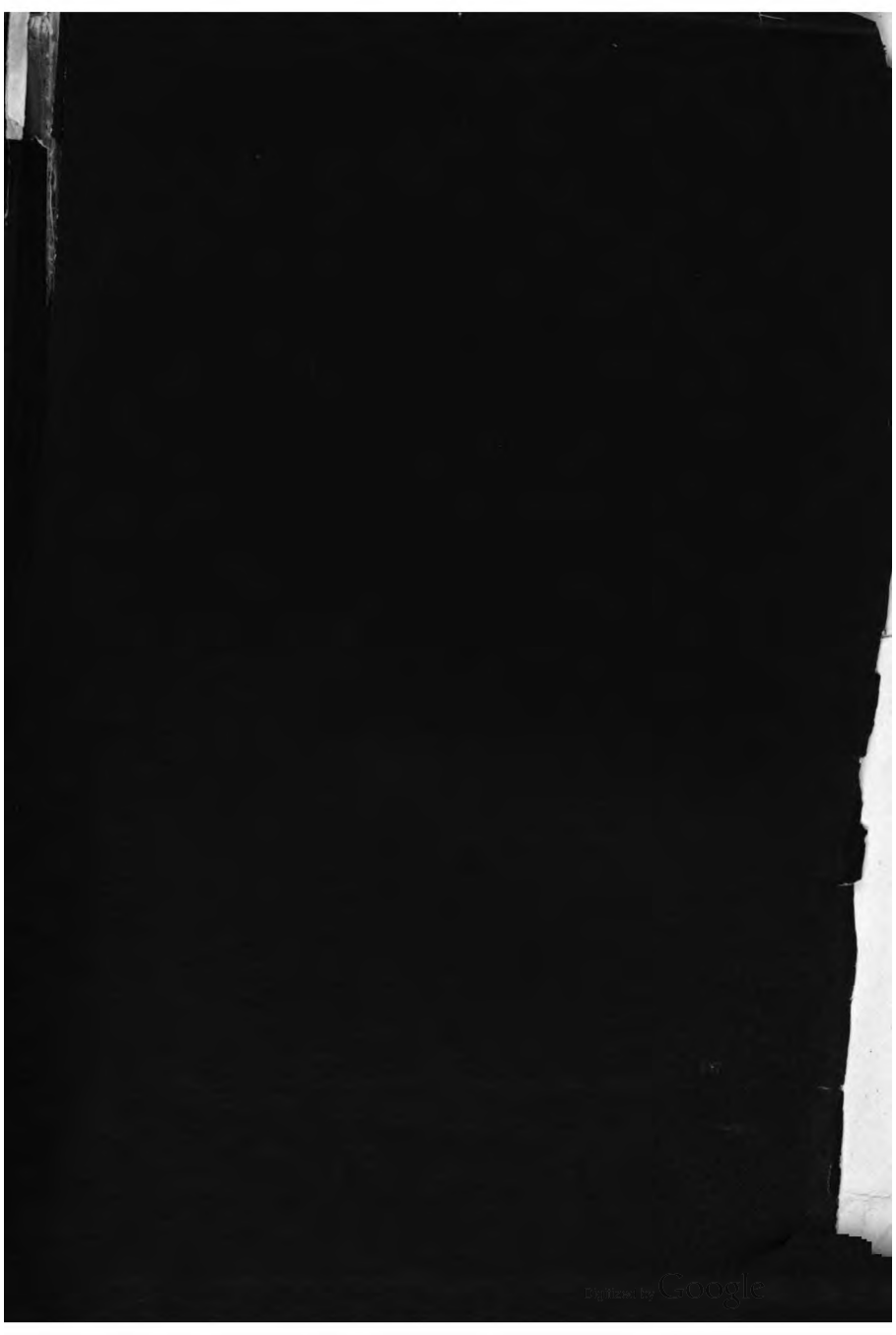
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PRACTICAL PRINTING.

A Handbook

OF THE

ART OF TYPOGRAPHY.

BY

JOHN SOUTHWARD,

AUTHOR OF "THE DICTIONARY OF TYPOGRAPHY," ETC., ETC.

Second Edition:

WITH AN APPENDIX ON BOOK-KEEPING FOR PRINTERS.

BY

ARTHUR POWELL, EDITOR OF THE *Printers' Register*.

LONDON:

J. M. POWELL & SON,

"PRINTERS' REGISTER" OFFICE, 33A, LUDGATE HILL.

1884.

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Gift
Mrs. Thomas N. Spaulding
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PREFACE.

The preparation of the following work was suggested by the present editor of the *Printers' Register*, Mr. Arthur Powell. As the conductor of that journal, he had frequently been consulted by persons requiring a practical manual of the art of Typography. There was a difficulty in recommending a book on the subject adapted to present day requirements. The two best English works of the kind are Johnson's "Typographia," published in 1824, and Hansard's "Typographia," published in 1825. Both are now out of print, and the few copies that are occasionally met with at the bookshops command considerable prices. These manuals, too, are not as useful to the present generation of printers as that for which they were written. They are largely occupied with methods and processes that are now nearly obsolete. In addition to this, there are the altered conditions under which the business of a printer is now conducted, especially since the great changes which have resulted from the general introduction of machinery, which require some elucidation in the interests of the young and inexperienced.

I was, therefore, commissioned to write a series of practical papers, which when collected should meet the want thus existent of a handbook describing practically the various modern methods of printing. With this object in view the chief portion of the matter following was originally published in monthly instalments extending over several years in the *Printers' Register*. In compiling the instructions an attempt was made to "begin at the beginning,"

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and to lead the learner on from the very rudiments of the art to such a knowledge of the various processes involved as would qualify him, with the necessary practice, to execute nearly any kind of ordinary work, or to efficiently discharge the duties of any situation appertaining to the trade. Some of the directions may appear superfluous, and it may be thought that several matters mentioned might have been left to what is called the "commonsense" of the reader. My own experience has been that it is precisely such apparently obvious and self-evident points that give the learner from a book the greatest trouble, and often involve him in the most serious misapprehensions. Hence I have thought it better to err on the side of superfluity than of insufficiency and vagueness—rather to lay myself open to an imputation of redundancy than, while seeking an appearance of brevity and conciseness, to risk the omission of directions for lack of which the reader might be hindered and impeded in his experimental study of the art.

I would avail myself of this opportunity, at the very beginning of this book, of addressing one caution, especially to my younger readers. With whatever care on the part of the author a manual may be prepared, and with whatever diligence on the part of the learner it may be studied, it may usefully supplement but it cannot supersede that practical teaching which the printing-office itself alone can supply. No handicraft can be learned by one who merely reads about it; as all the instruction in the world will not enable a man to swim who does not venture into the water. In the present day there is, perhaps, a tendency to rely too much upon text-books, and to neglect handicraft. It is as though in learning the theory we neglected the practice. This appears to be a kind of reaction from the custom of former times, when nearly everything was done in that unthinking and unscientific fashion which is called "rule of

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thumb." The journeyman could usually give no better reason for his method of working than that he had seen it so done before, or that he had been told to do it so, or that he had found it was best to do it so. As every good thing is liable to be abused, so the information contained in books may be misapplied if it lead any one to depreciate the value of workshop practice. Words cannot adequately indicate the method of even the simplest operation in printing. I was at some pains, for instance, to point out the proper manner of holding type in the hand during distribution; yet I am quite conscious that the result is about as satisfactory as that which would follow an attempt to describe colour to the blind, or the laws of harmony to the deaf. A glance at a workman in the act of distribution would give a more accurate idea of how the operation ought to be done than a page of directions. Yet books of this kind have important uses, and the increasing demand for them is an evidence of a laudable and encouraging desire on the part of those interested in the several trades to understand the principles of the handicrafts they follow.

Another caution, and the book may be placed, if not with confidence, at least with hope as to its usefulness, in the hands of its readers. The art of printing is in many of its branches a progressive art; the methods of to-day are as distinct an advance upon those of yesterday as to-morrow's will be upon those with which we are now acquainted. A treatise like this can only describe what is done now; it cannot anticipate improvements yet to come. These will be duly chronicled, explained, and criticised in the technical press of the trade. I cannot too emphatically urge upon all who are interested in the art of printing that it is absolutely impossible to understand and appreciate its successive developments without a careful study of the trade journals. They, and they only, keep a printer "posted up" in the

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changes which time brings about in the practice of his calling. It has been my privilege to devote the last fifteen years of my life almost entirely to writing for these journals, and I have had innumerable opportunities of witnessing the vast benefits which the professional press has conferred upon all concerned. I look to the pages of these journals to supply many shortcomings in this work, as well as for instructions in many, at present, undreamt-of improvements in the art of Practical Printing.

I ought to add, in conclusion, that I have to thank Mr. Powell for many kindly suggestions, hints, and corrections; and not a few friendly readers of his excellent and influential journal for valuable assistance and information. Further help in this way is earnestly solicited in view of a new edition being required. J. S.

The above is the substance of the preface to the first edition. In less than twelve months all the copies of that issue were sold out—an almost unprecedented fact, in regard to a technological manual published at the price of this book. The favourable reception which the trade have accorded, and the increasing demand for copies, necessitated this second edition, which has been revised throughout.

The Appendix, on "Book-keeping for Printers," now added, is by Mr. Arthur Powell. It is believed to be the most complete and the most practical treatise on a subject of great importance that has yet appeared.

The author has to express his heartfelt thanks to the typographical Press at home and abroad, for their indulgent and, he fears, too flattering reviews of the first edition of his work.

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PRACTICAL PRINTING.

INTRODUCTION.

Caligraphy, Xylography, and Typography.

IN ancient times the usual method of making a copy of a written literary production consisted, simply, in writing it over again. It was a tedious, slow, and costly process, and the copies were not always perfect reproductions or correct transcriptions of the original. Those manuscripts which have come down to us are frequently very beautiful. The art of making them was called *Caligraphy*,* and was chiefly practised by gifted monks, specially trained, who frequently passed their whole life in executing an illuminated copy of one solitary work. The majority of manuscript copies, however, were not of this high order, and were executed in a more wholesale manner. In most of the monasteries a room, called the Scriptorium, was set apart for copying manuscripts, and in it one of the monks read aloud the words to be copied, while the rest wrote them down from his dictation. The copies were then given to some learned man for revision, and to be compared with the original. Despite the utmost care taken to prevent them, errors frequently occurred, and not infrequently were overlooked. In modern times these variations or errors, particularly in the copies of Holy Scriptures and in religious manuscripts, have given much trouble and have been the cause of many controversies.

* Calig'raphy is from the Greek καλός, *fine*, and γραφή, *writing*. It is sometimes improperly spelt with two l's.

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It is generally believed that to the Chinese the world is indebted for a vast improvement on this system of reproducing and multiplying copies of manuscripts. This ingenious people engraved the design of their writings on blocks of wood or other substances. This engraving was done the reverse of the original, and it was done in relief. A pigment was applied to the surface of the design, and then, by pressure of some kind, the pigment was transferred to the material, such as paper, on which the copy was to be produced. When a second copy was required, it was not necessary to draw or engrave the design over again, but merely to ink the surface of the block and press it upon the paper, when a facsimile was obtained. Any number of copies might thus be produced.

This was the origin of Printing, the essence of which is pressure—the mode of transferring the ink or pigment on the design to the substance that is to form the copy. Many books were printed in Europe in this manner, and they are known as Blockbooks, because each page consists of a single engraved block. The block itself was generally of wood; hence this kind of printing is called *Xylography*.* Its two chief advantages were, the readiness and comparative inexpensiveness with which copies could be produced, and the absolute verisimilitude of its results. Every copy was alike in every important particular.

About the middle of the fifteenth century, in Germany, there was introduced a still greater improvement. Instead of engraving one entire page of characters, and then another page, and so on, separate characters were cast representing separate letters. The economy of this expedient is so vast, and apparently so obvious, that it appears marvellous that it was not thought of before. If, for instance, the letter M occurred on each page of a book containing twenty pages, by the system of block printing it would have to be engraved twenty times over. But if the letter were cut out from the first page it might be stamped in its place on the second and third and succeeding pages—only one engraving being necessary. The other letters might be reproduced in the same way, and a

* Xylog'raphy is from the Greek ξυλόν, *wood*, and γραφή, *writing*.

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stock of letters sufficient to print the first page would be almost—but, as will be seen hereafter, not quite—sufficient to print the remaining nineteen pages. These separate letters or characters, which can be used over and over again, in endless combination with other letters, are called types, and the mode of printing with them is called *Typography*.* The great merit of this method is the rapidity and extreme cheapness with which an unlimited number of copies of any literary production can be produced. Thus was conceived the greatest and most useful invention the world has ever seen.

Hail, mystic art! which men like angels taught
To speak to eyes, and paint embodied thought!
The deaf and dumb, blest skill, relieved by thee,
We make one sense perform the task of three.
We see—we hear—we touch the head and heart,
And take or give what each but yields in part;
With the hard laws of distance we dispense,
And, without sound, apart, commune in sense;
View, though confined—nay, rule this earthly ball,
And travel o'er the wide-expanded all.
Dead letters thus, with living notions fraught,
Prove to the soul the telescope of thought;
To mortal life immortal honour give,
And bid all deeds and titles last and live.
In scanty life, Eternity we taste,
View the first ages, and inform the last;
Arts, History, Laws, we purchase with a look,
And keep, like Fate, all nature in a book.

Mrs. Grierson.

Any kind of printing from designs engraved in relief, whose ink is transferred by pressure is included in typographic or letter-press printing, although there may not be, strictly speaking, types of letters. Such, for example, are small ornaments, straight lines, and illustrations; provided they are in relief, the mode of printing from them comes under the designation of letter-press printing, or typography.†

* Typog'raphy is from the Greek τύπος, *type*, and γραφή, *writing*.

† This book, as its title implies, treats only of the *practice* of printing. A condensed but accurate account of the origin and progress of the art will be found in "A Short History of the Art of Printing," by A. C. J. Powell, London, 1877, 4to. A larger work, embracing the results of modern researches, is a *desideratum*, at least in the English language.

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PART FIRST.—COMPOSITION.

CHAPTER I.

TYPES—The Fount—the Letters—Capitals, Lower Case, and Small Capitals—Diphthongs—Ligatures—Accented Letters—Figures—Fractions—Points—Reference Marks—Dashes—Braces—Signs—Quadrats—Spaces—A Bill of Type.

THE letters, marks, and signs with which letter-press printing is executed are called *types*. Among the types are included such accessories as spaces, as will be explained hereafter.

A complete assortment of types is called a *fount*. *

A fount consists of the following descriptions of types, viz.:—

Letters.	Reference Marks.
Diphthongs.	Dashes or Metal Rules.
Ligatures.	Leaders.
Accented Letters.	Braces.
Figures.	Signs.
Fractions.	Quadrats.
Points.	Spaces.

Founts of "fancy" letters, however, do not include all of these sorts.

Roman letters are of two kinds, majusculæ or capitals, as M, and minusculæ or small letters, as m. Owing to the position they occupy in the "cases" or receptacles provided for them in the printing office, the capitals are called "upper-case" letters, and the small ones "lower-case" letters.

The Capital letters used in the English language are—

A B C D E F G H I J K L M N O P Q R S T U V W X Y Z.

* When an order is given for an incomplete assortment of types, as for example for a certain quantity of different specified letters, it is said to be an order for *sorts*. Typefounders call any supplementary supplies to founts "imperfections." So when a compositor is deficient of certain types he is said to be "out of sorts."

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The Lower-case letters are—a b c d e f g h i j k l m n o p q r s t u v w x y z.

In modern printing a third kind of letters has been introduced, which are of the same shape exactly as the capitals, but smaller, thus M. Hence they are called *small capitals*. The Small Capital letters are—A B C D E F G H I J K L M N O P Q R S T U V W X Y Z.

Certain Latin and Greek words contain, in addition to nearly all these letters, two *diphthongs*, which are made to correspond in shape with the capital, small capital, and lower-case sorts respectively, thus:—

Æ Œ, Æ Œ, æ œ.

Of late years, however, the use of these diphthongs has been nearly abandoned, the component letters being printed separately—as musae for musæ. Diphthongs are also used in such English words as mediæval, archæology, &c., but the practice is becoming gradually rarer. The two coalescent vowels have already been thrown out of such words as economical, cemetery, &c., but it may be desirable to retain them in proper names, as Cæsar, Phœnicia, if not written Caesar, Phoenicia.

Types representing two or more letters, as f and i, which, on account of having overhanging parts, could not be brought closely together without injury, are supplied, and are known as "ligatures." The top of the f would either override the dot of the i or be broken off, were the two brought into juxtaposition, hence the two letters are cast on one shank. The only ligatures* found in modern founts are five, viz:—

ff, fi, ffi, fl, and ffl.

These are called by the type-founders and some writers on the subject, "double letters," which is incorrect, the only double letter being the ff. "Ligature" is also somewhat improperly implied, as the word means not the things joined or connected, but the bond or connection which binds them together.

* The diphthongs are also ligatures, but as they have a specific name in the printing office, it has not been thought advisable to class them with the so-called "double letters."

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The *accented letters* are the five vowels with certain marks over them, and named thus:—

Acute	á	é	í	ó	ú
Grave	à	è	ì	ò	ù
Circumflex	â	ê	î	ô	û
Diæresis	ä	ë	ï	ö	ü
Long	ā	ē	ī	ō	ū
Short	ă	ĕ	ĭ	ŏ	ŭ

There are also regarded among the accented letters the cedilla (ç) and the tilde (ñ) used respectively in the French and Spanish languages. For printing the Welsh language there are the accented w and y. An accent mark, cast on a separate type, is also supplied, thus—′

The *figures*, or Arabic numerals, are—1 2 3 4 5 6 7 8 9, and the cypher 0. *Scratched* or *cancelled figures* are also used, especially in arithmetical works.

Certain *fractions* are cast in one piece, and supplied with every complete fount. They are—$\frac{1}{4}$ $\frac{1}{2}$ $\frac{3}{4}$ $\frac{1}{5}$ $\frac{2}{3}$ $\frac{1}{6}$ $\frac{1}{8}$ $\frac{3}{8}$ $\frac{5}{8}$ $\frac{7}{8}$. If other fractions are needed, they require to be made up with small types, called *split fractions*, which are half the depth of the body of the type they are to be used with. The horizontal stroke dividing the numerator (the upper figure) from the denominator (the lower figure) is cast on the latter, thus—$_{1}$ For greater clearness, some printers prefer fractions formed with a diagonal line between the two parts, thus 1/2

The *points* * are named thus:—

Comma ,	Period or Full-stop .	Parenthesis ( )
Semicolon ;	Interrogation ?	Bracket [ ]
Colon :	Exclamation !	Hyphen -
	Apostrophe ’	

Reference marks are named as follows, and used in the order in which they are here set out:—

a. * Star	*c.* ‡ Double Dagger	*e.* ‖ Parallel
b. † Dagger	*d.* § Section	*f.* ¶ Paragraph

* "Points" is here used to include a class of symbols which are, variously, marks of punctuation, signs adopted for the purposes of elocution, and characters for other uses. The word is not strictly applicable to some of them, but technically the classification is convenient.

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Dashes and *metal rules* are short horizontal lines cast in the middle of the top of the shank. They are of four kinds, the en dash, half the width of the em; the em dash —; the two em dash, the three em dash, and the four em dash, respectively twice, thrice, and quadruple the width of the em.

Leaders consist of two or three dots similar to full-points (..) or (...) cast on one type to the em body. There are also two, three, and four em leaders, the number of dots being multiplied according to the breadth to which they are cast.

Braces are characters composed of two long curves, thus ⁀. They are cast in different sizes, to embrace two, three, or four lines of type, and are called respectively two, three, and four em braces. When a brace is required to extend over any large space, it is composite, consisting of parts, called *middles* (⌡) and two *corners* (⌜ ⌝). Dashes or metal rules are used, and the brace is made up thus—

⌜ —— — · ⌡ · — —— ⌝

The *signs* are—the ampersand, or "short and" (&)*, the symbol for libra, or pounds sterling (£), for dollars ($), for the word per (℔), at (@), for the pound avoirdupois (lb). The diagonal line (/) is sometimes supplied for dividing shillings and pence, thus 15/2. There is also supplied the index, or, as compositors call it, the hand or fist (☞), which is used to point out lines or passages of importance. Other characters are occasionally included in a fount arranged for a special purpose; as will be seen hereafter in the chapter on "Abbreviations."

The fount includes certain pieces of metal which are not intended to make any impression, being less in height than the printing characters, and which thus escape the ink applied to the surface of the rest. Their use is to separate words and letters, and to make lines of types of uniform

* This was originally a ligature & (*et*, Latin for *and*), and when the alphabet was repeated rapidly the last character named was "*et per se, and*" (that is, et by itself, and), which became corrupted to "and per se and," and thence to "ampersand."

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length. They are called *quadrats* (from the Latin, *quadratus*, squared) and *spaces*.

Quadrats, or "quads" as they are termed in the printing office, are pieces of metal of various widths—these widths being multiples of the square of the depth of the type, which in the normal body is the same as that of the M. They are of five kinds:—The em; the two em, which is twice the width of the em; the three em, which is three times the width of the em; the four em, which is four times the width of the em; and the en, which is half the width of the em. In order to "justify" split fractions like $\frac{2}{1757}$, en and em quads are also cast to half the depth of the body. In founts of large type *quotations* are included. (See chap. vii.)

Spaces are of four kinds, and called respectively, thick, middle, thin, and hair spaces. Three thick spaces, or four middle spaces, or five thin spaces, equal one em quad. The hair spaces average eight to the em, but range between seven and ten, according to the size of the body.

The number of different characters in a fount of Roman and Italic is as follows:—

Roman capitals, including Æ and Œ	28
,, small capitals, do.	28
,, lower case and double letters	34
,, ,, ordinary accents	21
,, points and references	16
,, figures and £	10
Italic capitals, including Æ and Œ	28
,, lower case and double letters	34
,, ,, ordinary accents	21
,, points	6
	226

To this might be added capital and small capital accents, and accents for the Spanish and Portuguese languages, as well as the italic figures and fractions.

In ordering type it is necessary to state whether or not the fount is to contain italic, fractions, leaders, or commercial marks. In ordering sorts to match type already in the office, state the type-founder's number of the face,

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as well as the size of the body; or, if this cannot be done, send a capital H or lower case m, as little used as possible, of the fount the sorts are to work with. State, also, the number of pounds or ounces required of each particular sort. Job founts (except scripts) being put up without spaces and quads, they should be specially mentioned if wanted.

A *bill of type* is a table showing the number of each of the several sorts in a fount. The fount may be large or small; but the sorts are supplied in certain definite proportions. The size of the fount is indicated by the number of lower-case m's, by which the number of each of the sorts is regulated. Following is a table of an English type-founder's bill of 3,000 m's. Such a fount would weigh about 750 lb in pica, 480 lb in long primer, 400 lb in bourgeois, 330 lb in brevier, 280 lb in minion, or 220 lb in nonpareil. The numbers of the respective letters are based on the requirements of the English language. Other languages would require the various sorts in very different proportions. In Latin and French, for instance, *q* and *u* would be deficient, *h* would be in excess, and *w* would be needless. The Welsh language would require a larger supply of *d*, *y*, *w*, *l*, and would not require *j*, *k*, *q*, or *x*. In fact, every language requires special proportions.

The Scotch type-founders, on the other hand, apportion the quantities of different sorts, not by number, as in the annexed bill of type, but by *weight;* for instance, 7 lb of *e* to 4½ lb of *a*.

Jobbing and fancy type is put up according to a different scale altogether, which is based on the number of each letter. This will be described afterwards.

In the "Old Face" founts there are some other types, as will be seen hereafter.

Printers are often required to estimate the quantity of type required for a work of a certain number of pages or a job of given dimensions. The following data upon which they can make their calculations may be useful. A page of type 4 in. by 6 in., set solid, weighs an average of 7 lb. 8 oz.; each square inch weighing 5 oz. Starting upon this basis, it is a simple process of calculation to

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A BILL OF TYPE.

Lower Case.		*Figures, &c.*		*Capitals.*		*Small Caps.*	
m	3000	,	4500	A	700	A	450
a	9000	;	800	B	450	B	270
b	2000	:	600	C	500	C	350
c	4000	.	3000	D	550	D	350
d	5000	-	1000	E	750	E	450
e	14000	?	300	F	450	F	300
f	3000	!	200	G	450	G	270
g	2000	’	800	H	450	H	300
h	6000	(	400	I	900	I	450
i	9000	[	200	J	300	J	200
j	500	*	250	K	300	K	200
k	800	†	100	L	550	L	300
l	5000	‡	100	M	650	M	300
n	8000	§	100	N	550	N	350
o	8000	‖	100	O	550	O	350
p	2400	¶	70	P	500	P	270
q	600			Q	200	Q	120
r	7000	1	700	R	500	R	330
s	8000	2	600	S	600	S	350
t	10000	3	600	T	800	T	420
u	4500	4	500	U	350	U	240
v	1500	5	500	V	350	V	200
w	2500	6	500	W	550	W	270
x	500	7	500	X	200	X	120
y	2500	8	500	Y	350	Y	200
z	300	9	500	Z	150	Z	120
&	300	0	700	Æ	100	Æ	60
ff	400	£	200	Œ	100	Œ	60
fi	500						
fl	300	é	200	½	150	SPACES.	
ffl	200	à	200	¼	150	Thick,	20000
ffi	300	â	100	¾	150	Middle,	8000
æ	200	ë	100	⅓	50	Thin,	8000
œ	100			⅔	50	Hair,	3000
—	500	All accents each.	other 100	⅛	50	Em Qds.	3000
———	150			⅜	50	En Qds.	6000
———	100			⅝	50	e.	20
———	80	& @ ℔ ℔,		⅞	50		25
...	100		ea. 50	⅕	50		25
.....	100	☞	30	⅙	50		25

Large Quads, one-tenth of fount. Italic, one-tenth of Roman.

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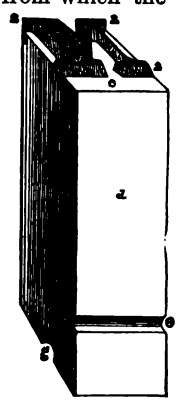
find the net weight of matter to be composed. Then fifty per cent. must be added to provide for the ordinary contingencies of composition, such as "running upon sorts," &c., and for the unset letter necessarily left lying in case after the work is completed. The result will be found near enough for all practical purposes, and may be relied upon as correct.

CHAPTER II.

TYPES—The Face—the Stem—the Serifs—the Kerns—the Beard, the Bevel and the Shoulder—the Shank—the Nick—the Groove—the Feet—the Pin Mark—the Burr—Batters—the Gauge—Low in Line—Picks—Qualities and Weight of Type—Type Metal.

CERTAIN parts of types * are distinguished by names, viz., the Face, the Shoulder, the Beard, the Shank, the Nick, the Groove, and the Feet.

The *face* of a type is that portion of its upper surface from which the impression is taken. It is marked *a* in the annexed diagram, and is divided into three parts, named respectively the stem, the serifs, and the kern.



The *stem* (marked 1) includes the whole outline of the type, thus M.

The *serifs* are the thin horizontal lines marked 2. The letter just shown would, when the serifs are added, appear thus M.

The *kern* is only found in certain of the letters, viz., those in which a part of the face overhangs the shank, as in the italic *f* and *j*.

The *beard* comprises the top of the type below the bottom line of the face;

* We speak here, of course, of rectangular types, such as are ordinarily in use. Various proposals have been made from time to time to modify the shape, for certain purposes. To fix them around cylinders, tapering types have been made, and to adapt them to distributing and composing machines they have been notched. The original shape as above delineated has been found to be the only one useful, or indeed practicable.

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it is divided into the *bevel*, or sloping portion marked *b* in the annexed figure, and the *shoulder*, or flat portion, marked *c*.

When lines of type are set up close together, the shoulder forms a distinction between them in print, by leaving a white space of certain width. It also accommodates in some cases the kern of a letter in the line preceding it.

The *shank*, marked *d*, is the entire body of the letter, exclusive of the face. The front part of it, or that part shown in the illustration, is called by compositors the *belly;* the corresponding part on the other side is called the *back*.

The *nick*, marked *e*, is a hollow place extending horizontally across the shank, a little above the feet.* Its use is twofold. It enables the workman to know which is the bottom of the letter by touch, instead of looking at it, a matter of the greatest importance, as will be seen when the process of "composition" is described. The nick also distinguishes between letters of an equal size of body but of a different description of face. There may be two or more founts of the same sized type with quite different faces, and by altering the position of the nicks, or making two or more nicks, the difference may be rendered instantaneously apparent.

Certain small capital letters in modern founts have nicks on the *back* of the stem near the shoulder, to distinguish them from lower case letters with which they might be mistaken. Such, for instance, is the s and s; o and o.

In 1836 the late Mr. Alexander Wilson invented an admirable system for nicking spaces and quadrats by which the body could be identified, and other advantages secured. In composition the workman takes no notice of the nicks of spaces and quadrats, as it is immaterial how they stand in the composing stick, and spaces and quadrats, of all bodies are indiscriminately mixed and used with founts of

* In English and American type the nick is always on the belly of the type; in French and other type it is on the opposite (or back) side of the type.

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corresponding bodies, no matter of what nick or face. Hence the idea of having "universal space nicks" arose. It is carried out thus—English has, in the centre, 3, pica 2, small pica 1, long primer 3, bourgeois 2, brevier 1, minion 3, nonpareil 2, pearl 1 nick. The printer thus knows the body of a space or quadrat directly he sees it, and he has a certain security against disorder on the part of his employees.

The *groove* (*g*) divides the bottom part of the type, or that on which it stands, into two parts, which are called

The *feet*. The annexed is an impression from a type turned upside down, and shows the feet, . Some printers call the whole of the under portion of a type the foot, but by the majority the groove is held to divide that part into two, these being the *feet*.

In most of the machine-made type there is a little round hollow on the side of the shank. This is called the *pin-mark*, and is caused by a projecting pin of the type-casting machine. It serves no useful purpose of the printer.

All types should be perfectly rectangular, and of an equal thickness throughout the shank. When types were cast exclusively in the hand-mould, two principal imperfections were experienced. One of these consisted in the type being broader at the lower extremity than at the top, the other in the upper part being broader than the lower part. These imperfections are now very seldom encountered.

Any roughness at the sides of the types owing to their being imperfectly dressed is called the *burr*.

Types which have sustained some injury to their faces, sufficient to render imperfect the impression taken from them, are said to be *battered*.

The *gauge* of a letter is its depth of face, measured from top to bottom; thus, the gauge of the annexed letter H is the length of its upright stroke. Letters of the same fount, whose depth of face is less than it should be, are said to be *small in gauge*. Those which are set lower on the body than the others, are said to be *low in line*.

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Any foreign matter that adheres to the face of a type, such as paper, roller composition, or hardened ink, clogs or fills it up, and causes a blotch in the impression. This is called a *pick*, and a brush, called a *pick brush*, is used to remove it.

The qualities which constitute good type are:—

a. The hardness and toughness of the metal of which it is made.

b. Its smoothness, sharpness of angle, and perfection of finish. A line of types, when viewed along the back, should present the appearence of a solid bar of metal, and a long series should be capable of being taken up between the fingers as if the types were cemented together.

c. Sufficient depth of face, and the clean formation of the feet and groove.

d. Accurate range with all the other letters of the same fount,* both in height to paper and width and depth of body.

e. The strength of the part supporting the kern, which is liable to be broken off.

f. The character of the design of the face, including *regularity of gauge, exactness in lining* and *setting*, and *evenness in colour*, producing an harmonious general effect in the impression.

The weight of type varies according to the kind of metal of which it is composed. Hence a pound of some founders' type will contain many more distinct letters than a pound of that of others. †

Type is sent out from the foundries in parcels, the types being duly composed into lines, and the whole secured

* Uniformity in the dimensions of the body of a type is imperative, for by it only can a true alignment be obtained. Types that are larger than others in this respect are called by the founders "big bodies," and the imperfection is caused chiefly by the hand-mould not being perfectly closed and held firmly in the process of casting. Modern types are free from this blemish.

† A single pound weight of the letter i in Diamond includes about 2,800 different letters; and in the same fount about 5,000 hair spaces go to the pound.

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by string. The parcel is called a *page* by the founders, whatever its size. The ordinary size, however, in the English foundries, is 6 inches long and 3½ inches wide; in the Scotch foundries it is 6¼ by 4. The letter m comes first, then a, b, and the rest of the fount. On the outside is written the designation of the fount, such as "Long Primer, No. 12" (corresponding to the number in the type-founder's specimen book).

Types are sold by weight, the price varying according to the size. Thus, a small fount of Pica will cost about 1/3 per pound, and the other bodies will increase in price inversely to their size, thus:—Long Primer, 1/6; Bourgeois, 1/8; Brevier, 1/9; Minion, 1/10; Emerald, 2/2; Nonpareil, 2/7; Ruby, 3/-; Pearl, 4/-; Diamond, 7/-; Brilliant, 12/-.

Sometimes, however, type is sold by the fount, especially in America. This applies chiefly to jobbing types. The fount is gauged by the number of the letters A and a in it, the number of the other letters being proportionate. Thus a 14A and 20a fount of Pica Attic is sold for $2·75.

Type Metal.—Small types, such as those used for books and newspapers, are, as already stated, cast * in metal.

The principal ingredient of type metal is lead, but, owing to its comparative softness, several alloys are mixed with it to render it harder, tougher, and more durable. †

Type metal is of two kinds, ordinary and hard metal.

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* Various modes of manufacturing type other than by casting them in a mould have at various times been proposed and patented, but they have all been successively abandoned.

† Types have been composed of other material besides lead and its alloys, such as brass and iron. The object has been to secure in the types greater hardness and durability, or to produce them at a lower cost. None of these, however, have come into general use, but in America a copper-alloy type is said to be held in favour. Some of them are too brittle, and others are objectionable on account of setting up a chemical action with the ink, especially coloured ink used in printing. The chief essentials of a type metal are its hardness and toughness, its capability to take a fine, clean-cut impression from the mould; its complete homogeneousness, and the absence of inferior soft parts in the casting; the temperature at which fusion takes place must not be higher than that which the mould is capable of bearing. For impressing uneven surfaces, such as unplaned wood, flexible types have been made, some of gelatinous substances similar to roller composition, others of a composition of india-rubber and gutta-percha.

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Ordinary metal consists usually of about seventy-five parts lead and twenty-five parts antimony, with about three per cent. of tin added. Metal for large sized type is softer than that for smaller sizes, and the varying hardness is given by smaller or larger quantities of antimony. This metal is now seldom used for type for printing books or newspapers.

The *hard metal* was introduced about 1854. Its superior hardness and durability is obtained by employing tin in large proportions with antimony, and so greatly reducing the use of lead with these metals (Johnson's patent, No. 817, 1854). Another mixture consists of lead, regulus of antimony, nickel, copper, and tin (Besley's patent, No. 1478, 1855). The French method of using copper as a hardening ingredient is also adopted by some of the founders. Hard metal is now almost exclusively substituted for the metal in ordinary use a few years ago, except for spaces, quadrats, and large types, which are made of a comparatively soft and cheaper metal.*

CHAPTER III.

TYPES—Short Letters—Ascending, Descending and Long Letters—Condensed and Expanded Letters—Superiors and Inferiors——Fat and Lean—Bastard Founts—Bodies of Types—The Standard—The Monometric System—Height to Paper.

TYPES which have the face cast in the middle of the shank, thus leaving an open space above them corresponding to that below, are said to be *short* letters. Of this description are a, c, e, m, n, o, r, s, u, v, w, x, and z.

* Since the introduction of the electrotyping process, several suggestions have been made as to the feasibility of obtaining a superior degree of hardness by deposition on the face of the type of a film of some hard metal, such as copper. Types so treated are known as *copper-faced*, and have come into use in this country and America, it being claimed that they do double the work, and in some cases treble the work, that can be done on type not coppered. The cost of copper-facing is for Long Primer about 6d. per pound. Some coloured inks, however, cannot be used with copper types, for the reason previously given; hence brass has recently been introduced as a substitute. The faces only of the letters, of course, are so coated, and not the spaces and quadrats. The necessity for any greater hardness than that of the ordinary types is now almost completely obviated by the use of stereotyping. The *cast* of the types is printed from, not the types themselves.

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Those letters whose stem extends to the top of the shank are called *ascending* letters. This class includes all the capitals and, in the lower case, b, d, f, h, i, k, l, and t.

Other letters have a stem extending over the shoulder. They are called *descending* letters, and consist of the lower case g, p, q, and y.

Letters which are both ascending and descending, and whose stems extend over the whole of the shank, are called *long* letters. They include, for instance, the capital Q and lower case j.

Types vary in their breadth, and are called *condensed* or *expanded* accordingly. The standard breadth of type is ascertained thus:—All the letters of the lower case alphabet are placed together in a line. If they occupy a space less than that occupied by thirteen ems of the same fount, they are said to be condensed; if they occupy more, they are said to be expanded. Typefounders, however, use the words "condensed" and "expanded" without reference to this rule.

For purposes of reference and for use in algebraic and scientific works small letters and figures are cast upon the upper part of the shank. These are called *superiors*. The following are examples:—

$$(a+b+c)^6; \qquad m^x \qquad m^e \qquad m^h$$

Letters and figures of the opposite character, or those whose faces are very low down on the shank, are called *inferiors*, thus:—

$$NH_4Cl+KHO=KCl+NH_3+H_2O$$

It is obvious that the distinction between ordinary letters and superiors or inferiors is found in the unusually large white space at the top or bottom of them respectively.

Types also vary in the strength and thickness of the strokes forming their faces. If they are very heavy and massive they are called *fat-faced;* if fine and delicate, *lean-faced.*

Types whose face is not in proportion to the depth of the shank are called *bastard* types. A face of the size appropriate to a type running ten to the inch, if cast on a type that runs six to the inch, is, for instance, of this kind.

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Types thus designed have a larger open space at the bottom than ordinary ones, which is the object for which they are so made. They render unnecessary additional spaces between lines which are intended to be a certain distance apart.

Bodies of Types.—Types are of various sizes, ranging from the kinds used in printing pocket bibles to those used for placards. As all ordinary types are of one uniform height, the variation is, of course, confined to the superficial dimensions of their ends or *bodies*, as they are called. Each body has a distinctive name. The following is a list of the bodies now cast by the British founders, commencing with the smallest:—Semi-Nonpareil or Minikin, Brilliant, Gem, Diamond, Small Pearl, Pearl, Ruby, Ruby-Nonpareil, Nonpareil, Emerald, Minion, Brevier, Bourgeois, Long Primer, Small Pica, Pica, English, Two-line Minion,* Two-line Brevier, Great Primer or Two-line Bourgeois, Two-line Long Primer, or Paragon, Double Pica, Two-line Pica, Two-line English, Two-line Great Primer, Two-line Double Pica, and Canon.† Above Canon the sizes are distinguished by their relation to Pica, and are called Four-line Pica, Five-line Pica, Six-line Pica, &c.

The following are specimens of the types used in book printing, and show the relation of the various bodies one to the other:—

GREAT PRIMER..... Instructions in impr

ENGLISH..... Instructions in improvemen

PICA..... Instructions in improvements i

SMALL PICA..... Instructions in improvements in th

LONG PRIMER..... Instructions in improvements in the art

BOURGEOIS..... Instructions in improvements in the art o

BREVIER..... Instructions in improvements in the art of P

MINION..... Instructions in improvements in the art of Pra

* This type is so called because the depth of its body is equal to twice the depth of Minion.

† Canon is Four-line Pica in body, but about Three-line in face.

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NONPAREIL..... Instructions in improvements in the art of Practica

RUBY..... Instructions in improvements in the Art of Practical Pri

PEARL..... Instructions in improvements in the art of Practical Printing.

DIAMOND..... Instructions in improvements in the Art of Practical Printing are to be foun

BRILLIANT..... Instructions in improvements in the Art of Practical Printing are to be found in th

Standard of Type.—There is, unfortunately, no standard of type common to all the British founders. Theoretically, the Pica em is exactly one-sixth of an inch in width; but even this is not universal, while the discrepancies in the sizes of other bodies bearing the same names, but cast by different founders, are sometimes very great. The following table, which gives as nearly as possible the number of types * of the various bodies to the foot, shows how greatly, in many instances, the type of one founder varies in size from that of another, although it bears the same name.

Body.	Caslon.	Miller and Richard.	Figgins.	Stephenson, Blake & Co.	Reed & Fox (Besley).	Patent Type-founding Co.†	Standard. ‡
Pica	72	72	72	72	72	72	71.5
Small Pica...	83.2	83	83	82	82	83	83
Long Primer	89.5	89	90	89	92	90	89
Bourgeois ...	102.1	102.5	102	102	103	102.85	102.25
Brevier	111.3	111	108.5	110	112	110.76	112.5
Minion	122.5	122	122	122	122	120	128
Emerald	128.5	138.5	128	128	...	138.5	...
Nonpariel...	144	144	144	144	144	144	143
Ruby-Nonp.	162	162	160	162	...	162	...
Ruby	166	166	166	164	163	166	...
Pearl	179	178	183	178	184	180	178
Diamond ...	204	207	204	...	210	205.71	205
Gem	...	222	...	...	...	...	...
Brilliant.....	...	238	...	...	...	...	...
Semi-Nonp.§	...	...	288	...	...	...	...

* The *depth* of the type (not the width) is used in measuring.

† The Patent Typefounding Company have adopted a system, devised by Mr. J. R. Johnson, called the "monometrical." The unit of measurement which forms the basis is obtained by dividing the Nonpareil body into ten parts, each of which constitutes a typographical "point," or unit. All the other bodies are simple multiples of this unit, as follows:—Semi-Nonpareil, 5 points; Brilliant, 6; Diamond, 7; Pearl, 8; Ruby, 9; Nonpareil, 10; Minion, 12; Brevier, 13; Bourgeois, 14; Long Primer, 16; Small Pica, 18; Pica, 20.

‡ This is the ideal standard given in Hansard's "Typographia," published in 1825.

§ We are unable to give a specimen of this type, owing to the characteristic incivility of the founders.

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The following table of the relative sizes of type is calculated on Hansard's theoretical standard, and although not strictly accurate in regard to the founts now in use, will be found practically useful:—

Double Pica	= Two Line	Small Pica.
Paragon	= „	Long Primer.
Great Primer	= „	Bourgeois.
English	= „	Minion.
Pica	= „	Nonpareil.
Small Pica	= „	Ruby.
Long Primer	= „	Pearl.
Bourgeois	= „	Diamond.
Brevier	= „	Minikin (Gem).

The measurement of the em to the lineal inch is also useful in justifying various bodies, although it is not mathematically correct.

4⅓ ems Great Primer	=	One inch.
5½ „ English	=	„
6 „ Pica	=	„
7 „ Small Pica	=	„
8⅔ „ Long Primer	=	„
9½ „ Brevier	=	„
12 „ Nonpareil	=	„
17⅓ „ Diamond	=	„

Height to Paper.—The average *height* of types in this country is eleven-twelfths of an inch. Types which are not up to the standard height are said to be *low to paper*. These types do not give a perfect impression. Sorts to match an old and worn fount are sometimes purposely cast "low to paper." Spaces and quadrats are three-fourths of an inch in height. "High" spaces, used in one of the stereotyping processes (as will be explained hereafter), are about five-sixths of an inch in height. It is not perhaps generally known that types subjected to hard wear, as in newspapers, become slightly *higher* to paper; the locking up tending to expand them in the direction of their length.

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CHAPTER IV.

BOOK AND JOBBING TYPE—Definitions—Roman and Italic—Divisions of Job Letter—Titling—Antique and its Modifications—Black Letter—Script—Old Style Roman—Wood Letter—How to Engrave Wood Letters.

HAVING regard to the purposes for which it is used, Type is divided into two classes, *Book Type* and *Job Type*.

Book Type includes Roman and Italic letters, the body, or text, of all works in this country being printed on those characters.

The *Roman* letters have already been described, and a complete alphabet given. The *Italic* letters follow, generally speaking, the shape of the Roman, but have an oblique inclination. The following is a complete alphabet:—

Capital Letters:—

A B C D E F G H I J K L M N O P Q R S T U V W X Y Z

Lower-case letters:—

a b c d e f g h i j k l m n o p q r s t u v w x y z

The number of long and short, kerned, and other varieties of letters is different in Italics to Roman. The points cast with the Italic inclination are the *? ! ; :*—the other points used being the same as the Roman.

Figures, or Arabic numerals, are now sometimes included in italic founts, thus—

1 2 3 4 5 6 7 8 9 0

Only in very exceptional cases are Italic founts furnished with small capitals.

Job Type includes a multitude of fanciful forms of letters, chiefly founded on the shape of the Roman and Italic letters. The variations are intended to give the characters greater prominence, lightness, elegance, &c.

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With the exception of Black letter (the insertion of which in the category of Fancy types will be presently accounted for), all of the job types at present in use have been designed during the present century. Previously, printers had no "display" letters whatever, and the monotony of a page could be relieved only by using different sized types of the Roman or Italic forms.

Consisting as it does of a large variety of miscellaneous designs, it is very difficult to make any satisfactory classification of Jobbing letter, but the following is that generally recognised :—

a. Romans, condensed, expanded, and of ordinary width.
b. Antiques ,, ,, ,,
c. Sans-serifs or Grotesques ,, ,,
d. Ornamented.
e. Blacks.
f. Scripts.

The first division includes a species of characters called *Titling Letters*. These consist of the plain Roman letters modified only in their proportions, in some cases being very narrow, and in others very broad in face.

The type known as *Antique* is the Roman capital letter, with strokes of nearly uniform thickness.

It is altogether impossible to illustrate or even enumerate all the varieties of job founts. Additions to them are being constantly made, and styles once popular are constantly going out of fashion and disappearing from the type-founders' specimen books.

There is another reason why we cannot attempt to go through the catalogue of job type designs. There are, it is true, a few leading kinds, but, generally speaking, the styles of the different founders vary. A particular form may be the special design of one founder, and no other founder is able or disposed to imitate it. If it be imitated, it is imitated under a different name, and as the names of fancy types are given to them on an entirely arbitrary principle, they form no indication whatever of the design or style.

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Black Letter.—The character known as Black letter is the most ancient used in printing. It was adopted in Germany by the first printers, in order to imitate the contemporary manuscripts. It is still used there, with certain modifications, as the principal text letter for book work and newspapers. The Roman form ultimately superseded it in France, Italy, and Spain. Caxton introduced Black letter into England, and it was long before it was entirely superseded, for even up to 1784 our acts of parliament were exclusively printed with it.

Anyone who examines the facsimiles of Caxton's types given in Mr. Blade's "How to tell a Caxton" (London, 1870), will see what a great difference there is between the Black letter type of the last quarter of the fifteenth century and that of the corresponding part of the nineteenth. The annexed specimen, from the foundry of Messrs. V. and J. Figgins, is perhaps the nearest approach to the real old style that may be had at the present time :—

Bois de L'Oberland

The modern letters, generally speaking, possess more symmetry than the ancient ones, and on that account are usually preferred. The following is an alphabet in modern Black letter :—

a b c d e f g h i j k l m n o p q r s t u v w x y z

This type, like the other fancy sorts, has been very ingeniously varied in thickness of strokes by condensation, expansion, &c.

Letters have been cut to represent the modern cursive, or Italian handwriting. These are generally called Scripts, but there is a great variety of forms of this character in use.

Old Style Roman.—Although this type is used as a text type for books and newspapers, it may be regarded as a "fancy" sort. Up to the early part of the eighteenth century the type used in this country was almost exclusively imported from Holland. William Caslon, who was

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then the foremost typefounder in England, introduced about that time a series of founts, based on the Romans used by the Elzevir family of Holland, but modified and rendered more elegant. He retained the fine clear cut of the model, but expanded it, gave it greater rotundity, and very much more distinctness. His types, and imitations of them, were nearly exclusively adopted until the year 1725, when their style was subjected to certain alterations, and finally developed into the style now known as Roman, a specimen alphabet of which has already been given. During the last few years the old style of Roman character has again come into fashion. The origin of this revival is thus stated in one of the publications of the Caslon foundry: "In the year 1843, Mr. Whittingham, of the Chiswick Press, waited upon the late Mr. H W. Caslon, to ask his aid in carrying out the then new idea of printing in appropriate type a work of fiction, the period and diction of which was supposed to be that of the reign of Charles II. The original old-face matrices of the first Caslon having been fortunately preserved—though without the slightest expectation of their ever again being used—Mr. Caslon consented, after much persuasion, and agreeing upon a special advanced price for the fount, the production of which it was anticipated would result in much trouble and no profit, undertook to supply a small fount of Old-face Great Primer. It was found, however, on getting a proof with good ink, on good paper, from a modern press, that the impression was far superior to the specimens printed at the time the fount was in general use. The volume, entitled 'The Diary of Lady Willoughby,' and published by Longmans and Co., was successfully completed, and commanded a good sale. So well was the old style of diction and spelling preserved, that very many believed it to be a reprint of an old manuscript. Mr. Whittingham was so satisfied with the result of his experiment that he determined on printing other volumes in the same style, and eventually he was supplied by Mr. Caslon with the complete series of original old-face founts, at an advance of twopence per pound on the modern founts. Mr. Whittingham must have felt sure that his example would be followed by other printers, and

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a demand for these old founts would thus be created; for he exacted a promise that in all cases an advanced charge of twopence per pound for these founts would be made—a promise which was faithfully kept until there appeared in the market a modern imitation of the old-face character called *Old Style*. The anticipations of the printer were fully realized, for, after the production of the work above alluded to, there followed a demand for the old-face founts, which has steadily increased up to the present time, and we can discern no indication of its declension."

The following is a complete alphabet of Pica from the original punches designed by the first Caslon:—

A B C D E F G H I J K L M N O P Q R S
T U V W X Y Z

A B C D E F G H I J K L M N O P Q R S T U V
W X Y Z

a b c d e f g h i j k l m n o p q r s t u v
w x y z

& æ œ ﬁ ﬂ ﬃ ﬄ ct ſb ſh ſk ſt ſ ﬁ ﬀ ﬂ ﬃ

A B C D E F G H I J K L M N O P Q R
S T U V W X Y Z Æ Œ

a b c d e f g h i j k l m n o p q r s ſ t u v w
x y z & æ œ ct ff fi ffi fl ffl

It will be observed that there are several ligatures in this fount not used in ordinary Roman founts, as well as two forms of the letter s.

As soon as this revival of old-faced characters became general, the other typefounders, as already stated, were called upon to meet demands for something similar, and new faces, called "Modernised Old Style," or "Mediæval,"

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were added to the specimen books. The following is an alphabet of this order :—

A B C D E F G H I J K L M N O P Q R S T U V W X Y Z

A B C D E F G H I J K L M N O P Q R S T U V W X Y Z

a b c d e f g h i j k l m n o p q r s t u v w x y z

It will be seen that the modernised type is much more regular in form than the original ; that the duplicate f has been abandoned, and that the number of ligatures has been assimilated to that in ordinary Roman founts.

The old style figures are obviously more distinct than the modern ones. They have been largely adopted in table work, even when the text matter is set up in ordinary Roman type. The difference will be seen readily in the following :—

£ 1 2 3 4 5 6 7 8 9 0

£ 1 2 3 4 5 6 7 8 9 0

The words "old face" and "old style" are at times used indiscriminately to the faces imitating the ancient founts, and to those which are a modern modification of them. It may, however, be desirable to make a distinction, and to call the one "old face," and the other, possessing the characteristics of the old style with the regularity, lightness, and finish of modern type, "old style."

Wood Type.—It has been already stated that the larger kinds of letters used for placards and advertisements are now cut out of wood, instead of being cast in metal.

The woods mostly used are rock maple, sycamore, pine, and lime. They are cut up, planed to the size, and then engraved, generally by machinery specially designed for the purpose. Formerly wood letter was exclusively cut by hand, by the aid of graving tools, chisels, &c. Wood-letter cutting is a distinct business of itself.

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Multi-Colour Letters.—For various ornamental purposes letters have been designed which may be printed in more than one colour. A red letter, for example, may have a black outline, and a shade in some other colour may be added to it. Each of these colours requires a separate block, as each has to be printed separately. Letters of this kind require great precision on the part of the designer and the engraver, and equal precision on that of the compositor and the printer.

Founts of wood letter are cut both in modern and old style, with lower case sorts, but the great majority of founts have no lower case sorts. Many of these are of an ornamental character. In size the letters extend sometimes to a depth of two or three feet, and a corresponding width. These are used for composite placards, that is, consisting of two or more sheets.

Wood letters are sold in founts consisting of so many dozen, usually 5½, 8, and 11 dozen if there are caps only, 11, 13, and 16 dozen if there are caps and lower case, besides two dozen of figures. The founts are proportioned to the number of E's and M's, thus:—

5½	dozen founts contain	4 E's	and 2 M's.
8	,, ,,	5 ,,	3 ,,
11	,, ,,	7 ,,	4 ,,
13½	,, ,,	9 ,,	5 ,,

American wood type, which is largely imported into this country, is made up into founts according to the number of A's, the following being a scale of three founts with their respective number of pieces:—

	3 A *Fount.*	4 A *Fount.*	5 A *Fount.*
Capitals only	74 ...	106 ...	120
Caps and lower case	138 ...	196 ...	224
Caps, lower case, and figures	164 ...	222 ...	250
Lower case only	64 ...	90 ...	104
Figures only	26 ...	26 ...	26

A full fount (caps, lower case and figures) 3 A = 13¾ doz.
,, ,, ,, 4 A = 18½ ,,
,, ,, ,, 5 A = 20¾ ,,

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It is occasionally convenient to be able to augment a fount by single letters, or to cut a line of type in some particular style. This may easily be done by any printer if he supply himself with the necessary tools and suitable wood. The printers' joiners sell wood in slips of various sizes and of a thickness equal to type height, ready planed up for this purpose. Should this not be procurable, select a piece of sound pine or deal an inch and a half in thickness, and get it planed to type height at the nearest joiner's shop or saw mill. It is better that the block should be slightly "low to paper" than "high," for it can easily be raised by pasting a piece of card underneath, or, as it is called, being "underlaid." Then finish off the surface with sand paper, and give it a light wash of whiting or chalk in solution. Draw the letter required on a piece of tissue or tracing paper the way it is to print—not reversed. If you have a printed copy, this of course will not be necessary. Take a piece of thin carbonic paper, or of tissue paper rubbed over with black lead or red chalk, and place it with its face to that of the block. Turn the drawing or the impression over, and lay it face downward on the coated paper. Then trace round the outlines with a needle or a steel point. Remove the two papers and the design will be found transferred to the block the reverse way. If another letter is required, repeat the process, taking care that the two letters are close together and perfectly straight on the block. When not required to be reversed, the design may be drawn on a piece of thin paper and pasted down on the wood; the whole may then be cut through with the tool. For cutting large type, a knife-tool, chisel, and two or three gouges are requisite. The knife-tool can be made by fixing a graver in a straight handle, similar to a gouge handle, allowing the end of the blade to project about an inch. Then sharpen the bevelled part to an edge, so as to make a sharp point to it. The letter must be cut round carefully with the knife. However long the line may be, continue without stopping if possible. When you arrive at a line crossing be careful to stop, or your work will be injured. When curved lines have to be engraved, the right hand and the tool should not move,

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but the block should, if possible, be turned round. Having gone round the outlines, cut away with a gouge all parts that are not to be black in the impression. In doing so, be careful to keep the edge of the letter as sharp and clean as possible. Work away from the outline, in the direction of the edge of the block, and let the open white spaces be gradually more deeply cut as they recede from the printing portions; if there is a large space, as at the top right-hand corner of the letter L, only half the thickness of the wood should be left. When the blank spaces are all neatly carved away, soak the block in linseed oil for a short time. Then cut between the letters with a fine saw, if they are to be separated.

CHAPTER V.

CASES—The Boxes—the Upper and Lower Cases—a Pair of Cases—Double Cases—Three Fount Cases—Four Fount Case on Two Different Plans—Six Fount Case—the Half Case—LAY OF THE CASE—Old-fashioned Bookwork Case—*Times* Office News Case—Provincial Daily Newspaper Plan—The *Printers' Register* Lay—Suggestion for Advertisement Case—The American Plan—The French Plan—Lay of the Double Case—McCorquodale's Plan for a Jobbing Double Case, and for a Jobbing Half Case.

THE smaller kinds of metal types are kept in shallow trays called *cases*, which are divided into compartments, one of which is appropriated to each of the sorts of which the fount consists.

Cases are made of wood, and the standard dimensions are 32½ inches long by 14½ inches broad. Their inside depth is 1⅛ inches.

The compartments are known as *boxes*, and each of them is lined at the bottom with paper, to prevent the face of the type being injured by coming in contact with the wood.

There are two principal kinds of cases, called respectively *upper cases* and *lower cases*. The latter is that which, when placed in position on its proper stand, or "frame," is nearest to the body of the workman, and the upper case is above it.

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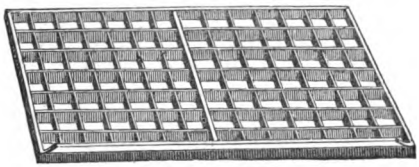
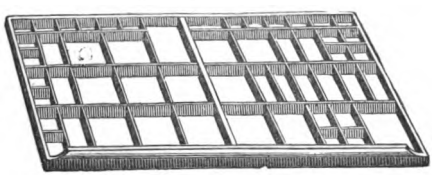
The upper case contains principally the capital and small capital letters, and the lower case the small letters. Hence capitals are called upper case sorts, and small letters lower case sorts.

The following is a view of an ordinary *upper case*:—



This case, it will be seen, consists of 98 equal-sized boxes.

The *lower case* consists of 53 boxes of various sizes, as shown in the following diagram:—



The smallest boxes of the lower case have dimensions slightly less than those of the boxes of the upper case, and the others are multiples of them. There are 26 of the small size; 12 boxes are twice as large; 14 four times; and 1 six times as large.

The reason that some boxes are larger than others is that of some kinds of types a greater number are contained in the fount, as will be seen in the bill of type.

An upper and a lower case together are called a *pair of cases*, and contain all, or nearly all, of the sorts that comprise a fount.

Some founts, however, are deficient of small capitals, such as *italic*, and are used in small proportion to Roman text letters. To accommodate these founts, *double cases* are made. In their dimensions externally they are the same as ordinary cases, but the arrangement of the boxes is different. They are divided by two stout bars into

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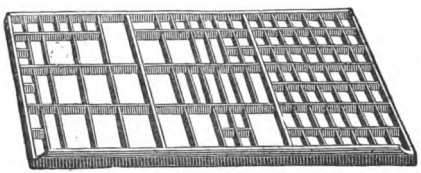
three equal parts, two of which are allotted to lower case sorts, and the third to upper case sorts. There are 53 lower case boxes, and 49 upper case boxes—together 102 boxes. The annexed is a view of a double case :—

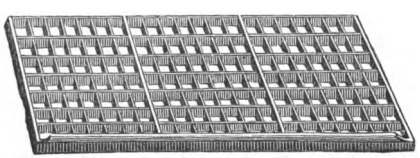


This case is sometimes, in that portion devoted to capitals, divided into six rows of boxes instead of seven, as shown above. The seventh row of boxes is not very useful, and its abolition gives greater space for the other boxes, which is regarded as an improvement.

This kind of case is used not only for small italic founts, but for founts of fancy letters which are provided with lower case letters.

A variety of other cases are made to accommodate two or more founts in one case. Whatever their arrangements in regard to the number and size of the boxes, they are all similar in outside dimensions. A few of the most useful plans are here shown.

The following case, called a *treble case*, will accommodate *three* founts consisting of capital letters only,



together with a few spaces or figures, as may be required. It contains 147 boxes.

If the boxes are made of the same height as those in the above case, but narrower in width, *four* founts may be accommodated in one case. This four-fount case contains 196 boxes.

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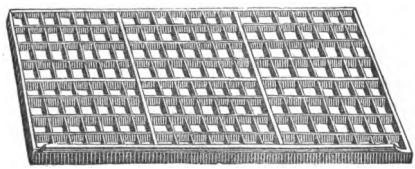
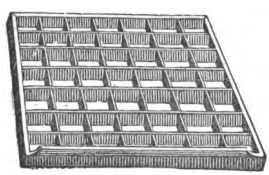
A modification of the four-fount case contains four complete founts of fancy or capital letters, while the boxes are as large as those of a three-fount case.

If the boxes are made still smaller, the case may be arranged to accommodate *six* founts (but there will be no



room left for figures or points in this arrangement), as in the above plan. This case contains 168 boxes.

A case is made to hold capital or fancy letters only, with figures and points, which is about half the width of the ordinary upper case; it is called a *half case*, and is divided into 49 boxes.



It is a matter of great importance, and one that has received much study, to arrange the several letters, points, &c., in the most convenient manner in the boxes. The types most frequently required should be nearest to the hand of the compositor as he stands at work, and those least wanted may be placed in the most remote boxes. It has been calculated that in setting up the common word "the," according to the ordinary arrangement of the types, a compositor's hand has to traverse about 40 inches. If those letters were removed to a less accessible situation, this distance would, of course, be increased in the ratio in which the letters are removed. As a man picks out about 1,500 types, and can replace, or "distribute," no less than 5,000 on an average per hour, it will

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be seen how necessary it is that the most economical disposition of the boxes should be adopted.*

The system on which the various types are distributed among the various boxes in a case is called the *lay of the case*. It varies to some extent according to the character of the work to be done, and varies in some minor details in different offices. The extent of this difference and the reason for the nonconformity of some offices to the general plans will now be explained.†

The following is the *lay of the case* which used to be generally adopted in offices where bookwork is chiefly done:—

Upper Case.

A	B	C	D	E	F	G	A	B	C	D	E	F	G
H	I	K	L	M	N	O	H	I	K	L	M	N	O
P	Q	R	S	T	V	W	P	Q	R	S	T	V	W
X	Y	Z	Æ	Œ	U	J	X	Y	Z	Æ	Œ	U	J
ä	ë	ï	ö	ü	—	£	á	è	î	ó	û	§	‡
1	2	3	4	5	6	7	á	é	í	ó	ú	‖	†
8	9	0	¼	½	¾	k	à	è	ì	ò	ù	¶	*

Lower Case.

—	]	æ	œ	'	j		Thin Sp.	)	?	!	;	...	fl
&													ff
h.s.	b	c		d		e	i	s		f	g		fi
ffi												En Quad	Em Quad
ffl	l	m		n		h	o	y	p	,	w		
z										q	:	Large Quads	
x	v	u		t		Thick Spaces.	a	r		.	-		

* With the exception of the first, or old-fashioned plan, none of the following have appeared in any technical hand-book. Preceding authors have either reproduced the schemes given by their predecessors, or have presented new ones of their own. We have selected, out of many which have been placed before us, some of the improved plans which have been actually carried out and tested by experience.

† It is said that a very simple re-arrangement of the present position of the spaces alone would reduce the distance travelled by a compositor's hand no less than *half a mile* in the space of an ordinary working day.

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Many printers place the figures 1—7 in the fifth row of boxes in the left-hand division of the upper case, immediately under the capitals; then follow, in the next row, the remaining numerals, 8, 9, 0, the £, and the fractions, ¼, ½, ¾. The last row contains the five vowels with diæresis marks, the c with cedilla (ç), and the lower-case k.

This case is well adapted for composition in English and Latin; but several sorts required in the Continental languages are unprovided for.

By the kindness of Mr. J. C. Macdonald, manager of the *Times*, we have been favoured with the following plan of the lay of the case adopted in the office of that journal:—

Upper Case.

A	B	C	D	E	F	G	A	B	C	D	E	F	G
H	I	K	L	M	N	O	H	I	K	L	M	N	O
P	Q	R	S	T	V	W	P	Q	R	S	T	V	W
X	Y	Z	Æ	Œ	U	J	X	Y	Z	Æ	Œ	U	J
1	2	3	4	5	6	7	á	é	í	ó	ú		
8	9	0	£			$	á a	è e	ì i	ò ö	ù û		
¼	½	¾	⅛	⅜	⅝	⅞	à	è	ì	ò	ù		

Lower Case.

)	]	æ	œ	k	j		Thin Sp.	'	?	!	;	fl	...
&	b	c		d		e	i	s		f	g	ff	
h s.												fi	—
ffl	l	m		n		h	o	y	p	,	w	En Quad	Em Quad
ffi													
z	v	u		t		Thick Spaces	a	r		q	:	Large Quads	
x										.	-		

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The following lay is adopted by several of the great provincial news offices. It undoubtedly displays several substantial improvements upon the old system :—

Upper Case.

~	~	~	~	—	—	—	½	½	¾	⅓	⅔	ç	]
*	†	‡	@	℔	lb	☞	⅛	⅜	⅝	⅞	⅛	!	?
‖	§	¶	∽	⌐¬	Æ	Œ	ffi	ffl	æ	œ		Æ	Œ
A	B	C	D	E	F	G	A	B	C	D	E	F	G
H	I	K	L	M	N	O	H	I	K	L	M	N	O
P	Q	R	S	T	V	W	P	Q	R	S	T	V	W
X	Y	Z	h.s.		J	U	X	Y	Z	$	£	J	U

Lower Case.

fl	ff	fi	—	)	;		y	1	2	3	4	5	6
&												7	8
,	b	c		d		e	i	s		f	g	9	0
j								Thin Sp.				En Quad	Em Quad
k	l	m		n		h	o		p	,	w		
z										q	:	Large Quads	
x	v	u		t		Thick Spaces.	a	r		.	-		

The following lay, suggested by the *Printers' Register* in 1880, is recommended as superior to all others, both for book and for news work. Its chief merit lies in the fact that in both cases the types most in demand lie nearest to the compositor's hand. In the upper case the small caps and the sorts seldom required are in the left half, where the "copy" is usually placed, so that this is disturbed much less frequently than when the lay is according to the old system. The advantage of having the capitals and the figures placed as they are, is obvious.

The changes in the lay of the lower case are considerable, though all the large boxes are tenanted by the same

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letters as before. The following reasons are given for the variations that have been made:—

Upper Case.

ä â	ë ê	ï î	ö ô	û	¼	½	@	₱	=	≍	☞	¶	‖
à á	è é	ì í	ò ó	ù ú	¾	⅛ ⅞	8	9	0	*	†	‡	⁂
´ ₀	%	$	℔	£	⅜ ⅝	⅔	1	2	3	4	5	6	7
X	Y	Z	Æ	Œ	U	J	X	Y	Z	Æ	Œ	U	J
A	B	C	D	E	F	G	A	B	C	D	E	F	G
H	I	K	L	M	N	O	H	I	K	L	M	N	O
P	Q	R	S	T	V	W	P	Q	R	S	T	V	W

Lower Case.

()	[]	”	—	z	x	e	v	?	!	æ	œ	fl	ffl
ç &	b	c		d		e	i	s		p	w	ff fi fi	...
j k	l	m		n		h	o	Thin Spaces	,	f	g	N Quad	M Quad
q h.s.	y	u		t		Thick Spaces	a	r		; .	: -	Large Quads	

The thin spaces are laid in the old *y* box, and thus the distance between them and the thick spaces is lessened by one half.

The *v* takes the box hitherto used for the thin spaces. It is thus brought closer to the *e*, *i*, *s*, and *o*, these being the letters with which it is most frequently combined.

The *y* is placed in the old *v* box, directly under the *l* and *b*. The large number of words ending in *ly* and *bly* is the reason for this alteration.

The *q* is brought from the right to the left hand side of the case. In its new position it is brought close to the *u*, without which it is never used.

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The *j* is also placed near the *u*, to which it comes next in about 200 words.

The *k* is brought from the upper to the lower case, to the saving of time and trouble.

The *x* is placed next above the *e*. These letters are combined in no fewer than 600 English words.

The comma, semicolon, colon, full-point and hyphen are all brought together.

This lay of the case has been adopted in many offices, and one at least of the great typefounders has announced that he will supply a plan of it to every purchaser of a fount of book or news type.

An ingenious lay of the case has been invented for the use of compositors engaged in work requiring two separate founts—such as advertisements, the first lines of which are usually set up in a size larger type than the rest. The fount for the first line is laid in the small capital side of the upper case, divisions being made by the compositors with reglet in the different boxes for the capital and lower case j, u, x, y, and z; the diphthong boxes being also divided to contain the points and em rules, of which a large quantity are used. The lower case is arranged as in the following diagram:—

(	]	&	æ	œ	k	j	e	Thin spaces	'	£	1	2	3	4
fl	?	b	t		d			i	s	f	g	5	6	7
ff	!											8	9	0
fi	;	l	m		n		h	o	y	p	,	w	en quads	em quads
ffl	:													
ffi	Half space	v	u		t		Thick spaces	a		r	q	—	Large Quads	
x	z										.	-		

On the right hand side are the sorts that are usually required together, viz., the figures, £, em and en

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quads, large quads, and em rules. On the left are the treble and double letters in one row, and the colon, semicolon, admiration, and interrogation in another. The b c i s f g l m u and v are all brought closer under the hand of the compositor without diminishing the usual space for the a e n o r or t. The advantages are said to be so great that a person can compose some thousand letters more per day than from any other case.

The annexed plan of the cases generally used in America may be useful to some of our readers. An examination of it will show that while the lay is founded on those used in this country, there are many important modifications, particularly in the arrangement of the "reference" marks, signs, and figures.

Upper Case.

*	†	‡	§	‖	¶	☞	lb	℔	@	%o	‰	′	°
¼	½	¾	⅛	⅜	⅝	⅞	$	£					
⅓	⅔	&	Æ	Œ	æ	œ	-	—			&	Æ	Œ
A	B	C	D	E	F	G	A	B	C	D	E	F	G
H	I	K	L	M	N	O	H	I	K	L	M	N	O
P	Q	R	S	T	V	W	P	Q	R	S	T	V	W
X	Y	Z	J	U	[	)	X	Y	Z	J	U	h.s.	ffl

Lower Case.

ffi	fl	thin	mid.	'	k		1	2	3	4	5	6	7	8
j	b	c		d		e	i		s		f	g		9
?														0
!	l	m		n		h	o		y	p	,	w	En Quad	EmQuad
z														
x	v	u		t		Thick Spaces.	a		r		;	:	Large Quads	
q											.	-		

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In France the upper and lower cases are generally combined, and the above is a plan of the arrangement of the

SUPERIORS.

A	B	C	D	E	F	G	a	e	i	l	m	n	o	r	s	t	v	ë	ï	ü
H	I	K	L	M	N	O	É	È	Ê	Æ	Œ	W	Ç							
P	Q	R	S	T	V	X	fl	â	ê	î	ô	û	!							
"	)	U	J	j	Y	Z	ff	à	è	ù	§	&	?							

·	ç	é	-	'			1	2	3	4	5	6	7	8					
/	b	c	d		e		s		Spaces	f	g	h	9	0					
—													æ	œ					
z	l	m	n		i		o		p	q	;	w	k						
y												fi							
x	v	u	t		Spaces		a		r		·	,	Quads.						

boxes. Fancy founts are usually kept in lower cases according to the following lay:—

È	Ç	É					1	2	3	4	5	6	7	8					
Ê	B	C	D		E		S		Spaces	F	G	H	9	0					
J													Æ	Œ					
Z	L	M	N		I		O		P	Q	;	W	K						
Y												&	:						
X	V	U	T		Spaces		A		R			,	Quads.						

In *double cases* two out of the three divisions are devoted to lower case sorts, and the third (the right-hand division) to capitals, figures, &c. The usual lay of the lower case divisions is the same as that of the lower case shown previously; that of the upper case division follows

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as a rule the lay of the left half of the upper case shown in the same section. The lay of this division, though, varies with the whim of the printer. Some prefer to substitute reference marks for the accented letters in the fourth row of boxes, while others place the figures and fractions in the two top rows, and the capitals in the last four. This latter is the most convenient arrangement.

The following is a plan of a jobbing double case used by Messrs. McCorquodale & Co. It will be observed, that though the lower case divisions are intact, the upper case division consists of five rows of boxes instead of seven; more space is thus allowed for the capitals—fractions and accentuated letters being excluded. The arrangement of the figures is also worthy of notice:—

&	£	æ	œ	(	j		Middle and thin spaces	'	?	!	1	2	3	4	5	6	7	8	9	0
fl	ƀ	c		d		e	i	s		f	g	;	ffi	A	B	C	D	E	F	G
ffl												fi	ff							
k	l	m		n		h	o	y	p	,	w	en quads	em quads	H	I	K	L	M	N	O
Hair spaces														P	Q	R	S	T	V	W
z	v	u		t		Thick spaces	a	r		q	:	Quads								
x										.	-			X	Y	Z	Æ	Œ	J	U

The following is a useful lay of the half-case, also adopted by Messrs. McCorquodale for small founts:—

1	2	3	4	5	6	7
8	9	0	£	&	Æ	Œ
A	B	C	D	E	F	G
H	I	K	L	M	N	O
P	Q	R	S	T	V	W
Y	X	.	:	'	J	U
	Z	,	;	-	! ?	

It will be seen that all the boxes in the top row, and all but two in the last, have been divided.

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CHAPTER VI.

FRAMES—Half, Three-Quarter, Whole, and Double Frames—Stools—Case Racks—Composing Sticks—Setting Rules—Galleys—Galley Racks—Letter Boards.

CASES are arranged in the printing-office on *frames*, or stands, made of some light kind of wood,* of the construction shown in the annexed illustrations.

The height of a frame is generally three feet six inches at the front, and four feet six inches at the back.† The cases rest on the sloping parts; the lower case being placed nearest to the front, and the upper case behind it. In this way the upper case is more inclined than the lower, and the boxes are brought nearer to the compositor than if the case were in a more horizontal position.

Frames should be made so as to be taken to pieces and re-erected without sustaining any injury, and nails should on no account be used in their construction. The principal portions should be mortised and tenoned, and the printer should apply a little tallow to these places to keep the wood in good condition. Large iron screws should be used for fastening the main bars of the frame together, as they are readily removable with a screwdriver, and the frame may then be taken down without any hammering or wrenching of the parts. When frames that are not required for use

* In America frames are called stands, and in the best offices are always made of iron. They are one inch higher than those in use here. The names also are different. A single stand is one at which only only one compositor can work, while a double stand affords space for two sets of cases and two compositors.

† The height of the frame is a very important matter to the compositor. If too low for his stature, it induces a stooping habit very injurious to health, and if too high it seriously retards the speed of his work. Hansard says that the height of a compositor and his frame should be so adjusted that his right elbow may just clear the front of the lower case by the *a* and *r* boxes, without the smallest elevation of the shoulder-joint, and his breast be opposite the thick space, *h*, and *e* boxes. Most printers think that a frame of this height is the best, both for quickness in composition and the reduction of fatigue to the minimum. A man about five feet six inches high will find the ordinary frames well adapted for him, but a taller man may elevate the cases by putting others underneath them; and a shorter man may stand on something that will raise him above the floor. Some remarks on the height of frames as conducing to speed in working will be made, subsequently, when treating of composition.

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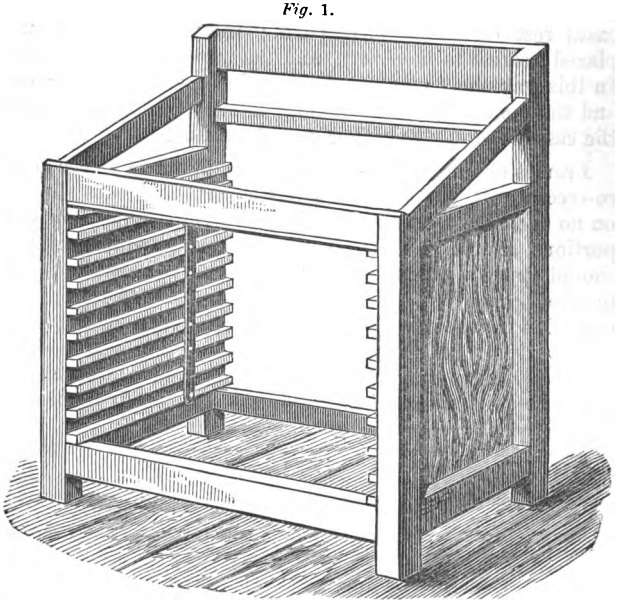
are thus taken to pieces, they can be easily packed in a very small space.

Frames are of various kinds, viz., half frames, three-quarter frames, whole frames, and double frames.

Half frames are those which hold one pair of cases only.

Three-quarter frames accommodate one pair of cases in position at the top, and are fitted with racks, or ledges underneath, to contain reserve cases, as in figure 1.

Fig. 1.



There are usually ten of these ledges, and they are placed two inches apart. The frame thus affords space for five pairs of cases.

Whole frames (see figure 2) hold two pairs of cases in position on the top.

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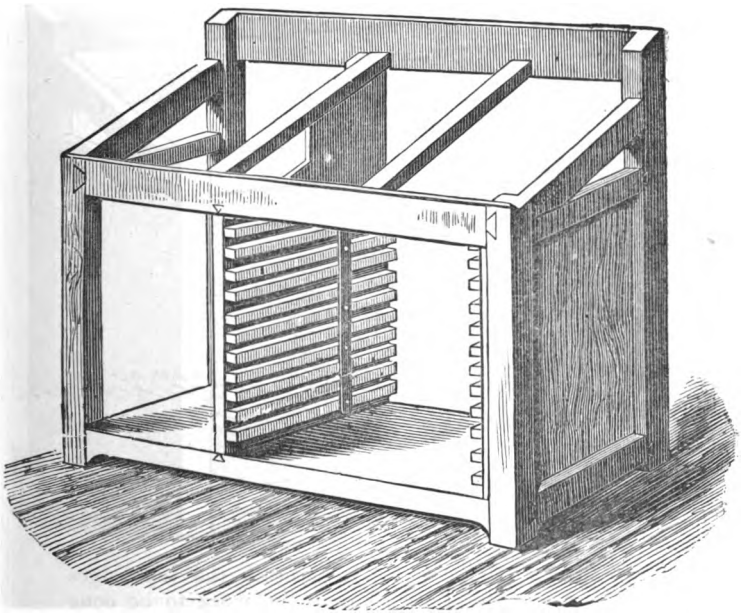
Fig. 2.



They contain a rack underneath for holding five pairs of cases. The remaining space is either left open, as in the illustration, and used as a receptacle for the compositor's clothes, food, &c., or is fitted up with drawers for copy, proofs, account books, &c.

Double frames hold two pairs of cases on the top, but are made wider so as to contain two racks underneath, with accommodation together for twenty cases (see fig. 3).

Frames of a smaller size than the half frames are made with racks which contain ten of the half cases mentioned in the last chapter, and two in position on the top. Being only about twenty-two inches wide, they can be placed in a spare corner.

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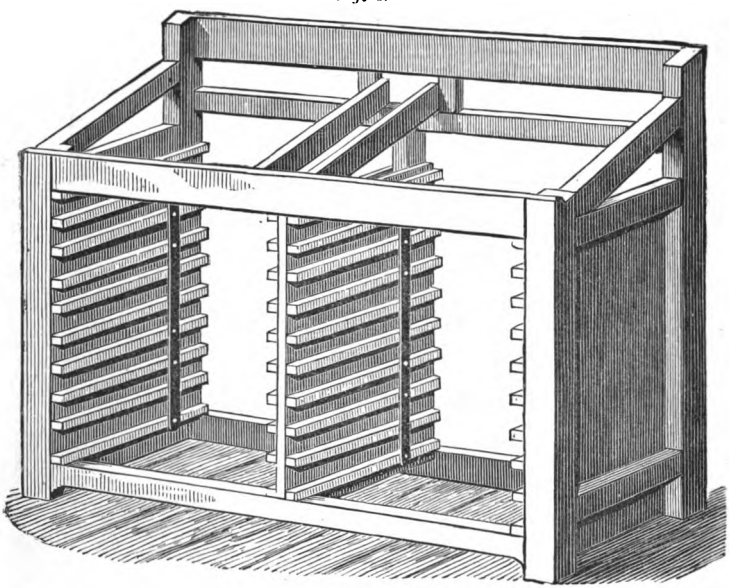
Fig. 3.



The fittings of the space underneath the top ledges of frames are arranged according to the work to be done at them, and contain various appliances to be hereafter mentioned.

Compositors' stools were ordinary accompaniments to frames in some offices, but are now becoming very rare. They have only one leg, placed in the centre, the workman steadying himself with his feet on the lower rail of the frame. The habit of using them is both idle and useless, and should always be discountenanced, especially in the young.

Cases for which there is no room in the frame-racks are arranged in what are called *case racks*, of one kind of which an illustration is annexed (fig. 4). Case racks which are made to hold two tiers of cases, side by side, are called *double case racks*.

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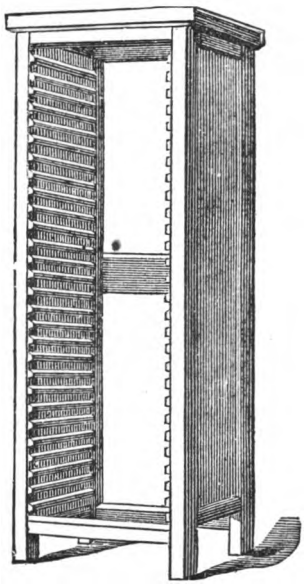
Fig. 4.



At the end of the frame, and about three feet from the level of the floor, a flat table is fastened to some of the frames, which is called the *bulk*. It is intended to contain composed matter. Its use will be described hereafter.

The instrument in which types, after being taken from the cases, are arranged in lines, or composed, is called the *composing stick*. The term is generally abbreviated to "stick;" in some parts of the country it is called a "setting stick."

For small types composing sticks are made of metal, either iron, brass, gun metal, or some more valuable metal; for large types, such as those used in placards, composing sticks are made of mahogany, and have brass or other metal fittings.

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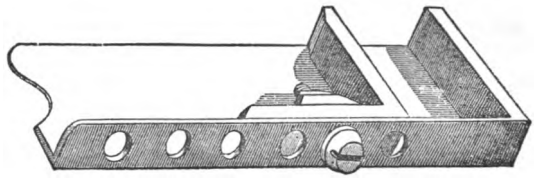
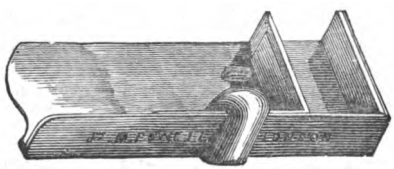
The annexed illustration shows the form of the ordinary composing stick.



The flat bed of the instrument is called *the plate*. Turned up from this plate at right angles are *the flange* and *the head;* the former being fixed to the long edge of the plate, and the latter to the short edge. The flange is $\frac{5}{8}$ of an inch high, and through it are bored holes, about an inch apart, to receive the screw. The head is of the same height as the flange, but is much stronger, and is securely fastened to it and the plate by rivets, dove-tailing, or brazing. The *slide* has an opening in the lower leg, or part which rests against the flange, to admit the tenon of the nut, which is shouldered to fit into the groove, and which nut is to receive the screw on its being passed through one of the holes to fasten the slide to any measure that may be required. This is done by means of the groove in the slide being moved backward or forward on the screw and nut, and by the screw being used at the hole convenient to the distance required, so as to set the slide at the point wanted from the head ; that is, to allow of the required length of line of the types.



Composing sticks are made, however, which obviate the necessity of perforating the flange ; illustrations of two of the most useful descriptions are here given.

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These sticks consist of only three parts, the body (the plate, flange, and head), the slide, and the screw, and they are more readily adjusted than the ordinary or screw sticks, but the latter are preferred when very exact adjustment is wanted, or any particular "measure" or length of line has to be preserved for a long time.

Other sticks are made in which the slide is a fixture, and the whole of the parts are in one. These, of course, are only adapted to one particular measure. They are usually made of mahogany, and have a thin lining over the plate and beside the flange and slide, this lining being of gun metal or brass. They are chiefly adapted for newspaper work, or work wherein there is never any alteration of the length of line. The following is an illustration:—

By splitting the slide of the screw composing stick, and putting the two parts asunder, an opening is made which forms a kind of supplementary composing stick. This contrivance is useful when two measures have to be composed simultaneously, as the text of a book and the side notes.

In a good composing stick the slide exactly coincides with the head and flange, and when pushed up it will leave no open space whatever in any part. The flange, also, should be perfectly at right angles to the plate.

Gun metal is probably the best material for a composing stick, owing to its lightness, strength, durability, and non-corrosiveness. Brass is liable to oxidation, and might then injure the hand, if held for a prolonged period.

The width of the plate of a composing stick in England and America is about two inches, but on the Continent

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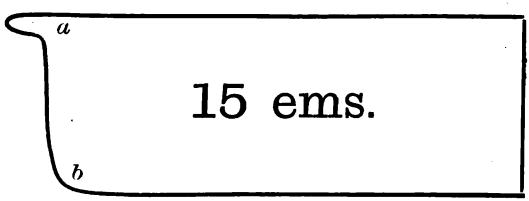
it is much less than that. Composing sticks are made in metal to certain lengths in inches, from about four inches to twelve; above that they are usually made of mahogany.

Composing sticks are usually called "sticks" in the printing office. In London and some of the large towns each compositor is required to provide himself with one or more of them for his own use.

To facilitate the arrangement of the types in a line, as will be shown hereafter, a thin flat piece of brass or steel is used, called the *setting rule* ("setting" being a synonym for composing). It is shaped thus:—



Its height is the same as that of type, but its length varies according to the length of the line to be set against it. The small projection, or neb, marked *a*, is called the *ear*, and by it the rule is lifted out of the stick. The part marked *b* is curved to allow of the rule being withdrawn when raised up by *a*.

After the type has been composed in the stick, it is transferred to *galleys*.

Galleys are thin trays, which on two or three sides are fitted with a flange to support the lines of type. They are of the form shown in the annexed engravings.

Above is a sketch of an ordinary "*slip*" *galley*, which

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is used principally in book work. Slip galleys are usually made in four different sizes:—

21	inches long	by 5	inches broad.
18	,,	5	,,
24	,,	6	,,
18	,,	7	,,

The height of the flange is the same as that of the composing stick.

The annexed is a *job galley*, used chiefly for jobbing work.

This galley is made in various sizes, which are known by the following names:—

	In.		In.
Demy Octavo ...	8½	by	5½
Demy Quarto ...	13	,,	9
Foolscap Quarto ...	10	,,	7
Royal	15	,,	10
Demy Folio ...	18	,,	11
Crown Folio ...	16	,,	10
Royal Folio ...	21	,,	13
Foolscap Broadside	19	,,	12
Crown Broadside	21	,,	14

The job galley and the preceding one are sometimes made altogether of mahogany, but for certain purposes the bottom is made of zinc or brass, and is about the sixteenth of an inch in thickness. The flange, or rim, is made of mahogany, and for greater strength the head and side parts are joined together at the upper corner by a triangular plate, well screwed in.

The following shows a newspaper slip galley, which differs from a common slip galley, having a flange surrounding

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it on three sides. The object of this is to enable a forme to be "locked up" in it, as will be afterwards explained. The flange is sometimes continued round the fourth side.

Newspaper slip galleys are made with either zinc or brass bottoms and wooden flanges, or are entirely cast in brass. Those which have wooden sides are sometimes lined at the head and on one or two sides with strips of zinc or brass. They should have metal corner plates, and be manufactured in the best manner. These galleys are generally made to the following sizes:—

23 by 4¼	25 by 6¼
25 ,, 4¼	27 ,, 4¼
23 ,, 5¼	30 ,, 4¼
25 ,, 5¼	

In the best kinds the sides are strongly riveted to the bottoms.

An improved galley is in use in America which is very much stronger than most of those used in this country. A tongue of metal is soldered to the brass lining, and this tongue is let into the wooden side, which is slotted, thus fastening at one and the same time, by means of the screws in the bottom of the galley, the lining, side, and brass bottom, making a galley which, inside, presents a perfectly smooth side surface. By this means the heads of the screws in the side lining, which in our style of galleys sometimes project and make pie, are avoided. There is also a strip of brass across the head of the galley which prevents the head and side from warping or becoming loose.

It is a great improvement to a newspaper slip galley to perforate the sides, near to the bottom, with a few holes. As type is often wetted on these galleys, the water cannot readily escape, and causes considerable inconvenience; whereas, if this plan were generally adopted, it could be got rid of immediately.

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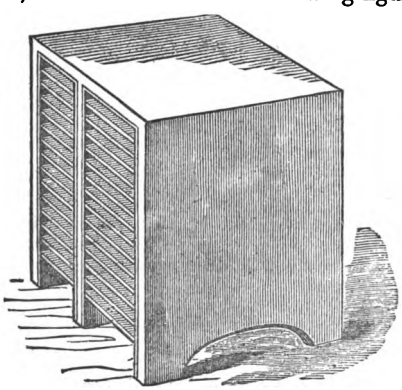
The newspaper galleys generally used are much too long and cumbersome. For all practical purposes a galley from twelve to fifteen inches long is sufficient. The top corners ought to be rounded off.

In former times, what were called *slice galleys* were largely used. These had a thin false bottom on which the type rested. The galley being placed on an imposing stone (*see post*), the body of it was drawn away, by seizing a projecting part of the head, leaving the type matter on the thin false bottom, from which it could be readily shifted off on to the stone. These galleys are seldom used now.

Galleys containing type are stored away in reserve in *galley racks*, constructed as in the following figure:—



A rack of this kind will contain about fourteen galleys on each side. For newspaper work, where the galleys are all of the same size, ledges are often substituted for shelves in the galley rack, as in the drawing which follows.

Galley racks are sometimes fitted up under composing frames, instead of racks for cases, or under the imposing surface.

A very economical arrangement for galleys is to make an internal rack in the back of the frame. A rack the full height of the back of the frame is very conveniently placed *between* two frames, when they are placed back to back.

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For most purposes the ledges in a galley rack should be so disposed that the galleys, when placed on them, should not lie in an exactly horizontal position, but be slightly inclined at one side. This causes the type to rest against the side that is most depressed, and renders any further protection at the other side unnecessary.

Composed type matter is sometimes kept on boards, and *board racks* are made to contain them. These are similar to the galley racks, consisting of a series of ledges on which the boards are held, but are much broader.

The *letter boards* are simply pieces of planks, truly planed, and clumped together with what joiners call "rails." They are about one inch in thickness, and are made to various sizes, such as double royal (42 by 27 in.), double demy (39 by 27), double crown (32 by 24), royal (30 by 24), demy (26 by 21), and crown (18 by 13). They are usually sold in pairs.

CHAPTER VII.

LEADS—Lead Trays and Racks—Brass Space Lines—Clumps—Stereo Clumps—Reglet—Wood Furniture—Metal Furniture—French and Improved French Furniture—Quotations—Curvilinear Furniture.

WHEN it is necessary to make a wider space between lines of types than is afforded by the shoulder, thin pieces of metal, cast for the purpose, are placed between the lines. These are called *leads*, because lead usually forms their principal ingredient.

Leads are in height equal to quads, or nearly so. In thickness they vary considerably, but are always cast so as to form aliquot parts of pica body. Four, six, eight, ten, or twelve of them are respectively equal to the thickness of a pica em quadrat, and they receive their names accordingly; thus we have four-to-pica leads, six-to-pica leads, and so on.

In length, leads must, of course, be exactly equal to the lines they are intended to space out. As the pica em is

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the unit of these lines, leads are cut to a certain number of pica ems. This, again, distinguishes different sizes; thus we have "20-em 6-to-pica leads," "10-em 4-to-pica leads," &c.

For certain stereotyping processes, leads higher than the ordinary quadrats are cast, and generally run to the same height as the stereo spaces and quads already referred to; but they need not be further mentioned until stereotyping itself comes under notice.

Leads are now supplied by the founders ready cut up to certain lengths, with great accuracy; but formerly printers were required to cut them up themselves, and as they used only a rough kind of shears for the purpose, the leads were very imperfect in accuracy, and occasioned frequently great inconvenience from that cause. Leads should not only be exactly in length, but of perfect truth throughout that length; that is to say, they should not be thicker in some places than others, and there should be no burr about them whatever. The top and bottom edges should not be sharp, but slightly bevelled off, and there should be no holes in the leads. These faults, characteristic of bad leads, are the result of carelessness in casting, or the use of an imperfect mould.

Leads are stored in the printing offices either in drawers, or lead galleys, in trays, or pigeon-holes. In any case a separate compartment must be appropriated for each size and description. Drawers are used when a very large quantity of each kind is required. *Lead galleys* are large sloping trays with bars running across them at certain distances to separate the sizes. Lead cases, or trays, are similar in dimensions to the ordinary letter cases, in order that they may be stored away in case racks. They are divided into sections by bars like lead galleys.*

The following table shows with sufficient accuracy the number of leads that go to the pound. Thus, if the leads are nine ems in length, a pound will contain 64 four-to-

* Cases may be had of the printers' joiners which contain only two divisions; they are called sanspareil cases, and are chiefly used for large letters, engraved blocks, &c. The printer can divide them as he requires, with the strips of wood which are sold for the purpose, or with the ordinary reglet.

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pica, 96 six-to-pica, or 128 eight-to-pica. If the number of lines to be leaded out is known, the weight of leads required may be immediately estimated:—

Lngth of the Lead.	NUMBER TO THE LB.			Lngth of the Lead.	NUMBER TO THE LB.		
	If 4 to pica.	If 6 to pica.	If 8 to pica.		If 4 to pica.	If 6 to pica.	If 8 to pica.
4	144	216	288	26	22	33	44
5	112	168	224	27	21	31	42
6	96	144	192	28	20	30	40
7	82	123	164	29	20	30	40
8	72	108	144	30	19	29	38
9	64	96	128	31	19	28	38
10	56	84	112	32	18	27	36
11	52	78	104	33	17	26	34
12	48	72	96	34	17	25	34
13	44	66	88	35	16	24	32
14	41	61	82	36	16	24	32
15	38	57	76	37	15	23	30
16	36	54	72	38	15	22	30
17	34	51	68	39	15	22	30
18	32	48	64	40	14	21	28
19	30	45	60	41	14	21	28
20	28	42	56	42	14	21	28
21	27	40	54	43	13	20	26
22	26	39	52	44	13	19	26
23	25	37	50	45	13	19	26
24	24	36	48	46	12	18	24
25	23	34	46	47	12	18	24

In this table fractional parts of leads are not given, as they are not practically required.

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The following table will show the weight of leads required for a thousand ems of the various bodies of type. The figures, although they may not always be mathematically correct, will greatly help the printer in his calculations:—

QUANTITY OF SOLID MATTER.	OUNCES OF LEAD REQUIRED.		
	8 to pica.	6 to pica.	4 to pica.
1000 ems Pearl	5	7½	10
1000 ,, Nonpareil	6½	9½	13
1000 ,, Minion.....	8	11½	16
1000 ,, Brevier	9	13	17½
1000 ,, Bourgeois	9½	13½	18½
1000 ,, Long Primer ...	10½	15½	20½
1000 ,, Small Pica	11	16½	22
1000 ,, Pica.....	12½	19	25

EXAMPLE:—Matter has to be set which it is estimated will make 20,000 ems small pica solid. Required the weight of six-to-pica leads necessary to lead this matter. By the table we find that 1000 ems of solid small pica require 16½ ounces of such leads; so $16\frac{1}{2} \times 20 = 330$ oz., or 20 lbs. 10 oz.

Roughly speaking, a pound of leads covers four square inches; hence, when the space required to be filled is known, it is only necessary to divide the number of square inches by 4, and the result will give the required weight in pounds.

When leads are wanted of a measure to which none have been cut, it is necessary to *piece* them; that is, to use two or more to make up the required length. Thus, to make up leads for a measure of 39 ems, two 15-em leads and one 9-em lead would be used. The following table shows the combinations that can be formed by leads

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of seven lengths only, not more than three pieces being required at one time; indeed, only two pieces are used in fifteen of the thirty-eight examples given:—

LENGTH IN EMS OF THE PIECES EMPLOYED:—

4	7	9	10	13	15	20.

4, 4 .....= 8	7, 9, 10.....=26	15, 15, 9.....=39
7, 4 .....= 11	20, 7 .....=27	15, 10, 15.....=40
4, 4, 4.....=12	15, 13 .....=28	15, 13, 13.....=41
10, 4 .....=14	20, 9 .....=29	20, 15, 7.....=42
9, 7 .....=16	20, 10 .....=30	15, 15, 13.....=43
13, 4 .....=17	20, 7, 4.....=31	20, 20, 4.....=44
4, 10, 4.....=18	15, 13, 4.....=32	20, 15, 10.....=45
15, 4 .....=19	20, 13 .....=33	20, 13, 13.....=46
7, 10, 4.....=21	15, 15, 4.....=34	20, 20, 7.....=47
15, 7 .....=22	20, 15 .....=35	20, 15, 13.....=48
15, 4, 4.....=23	20, 9, 7.....=36	20, 20, 9.....=49
20, 4 .....=24	15, 15, 7.....=37	20, 15, 15.....=50
9, 9, 7.....=25	20, 9, 9.....=38	

The printer has also at his command the seven single pieces used, viz.: 4, 7, 9, 10, 13, 15, and 20 ems. By using four, five, or six pieces together, the above combinations may be extended consecutively to one hundred ems.

It is desirable to avoid, as much as possible, the use of two leads of the same length for piecing. Unless an occasional full length is used, or quadrats happen to cross the joining, the pieced leads "spring" in the middle, and are apt to cause that irregularity called a "squabble"

Instead of "leads," what are called "space lines" are now commonly used. In dimensions they are the same as leads, their composition only being different. Brass is chiefly used for the purpose, and space lines of this metal are "truer" than leads, and not so liable to bend or break. Hence they are especially adapted for newspaper work. At the *Times* office, when leads were used, about two hundredweight were required annually to replace those destroyed by ordinary wear and tear. The brass space

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lines were introduced in 1866, and were in use, without being damaged, in 1870, a fact which proves their great durability. In stereotyping they do not shrink with the heat as leads do, nor lessen in width through contact with the thin letters. This shrinking is so serious, that in some offices leads formerly required to be renewed every four months. As brass space lines do not bend, they never cause "springing" in locking up. In regard to price per pound, they are very much more expensive than common leads—the six-to-pica of the latter costing 8d. per pound, while the former cost 2s. per pound. The brass lines, however, are one-fifth lighter in weight than leads, consequently to every 80 leads of a given thickness there would be 100 brass space lines. This fact, together with the great durability of brass, renders the use of them very economical, and they may be regarded as one of the most important modern improvements in the *matériel* of printing.

Clumps,* the use of which will be described when we arrive at the processes of Composition, are pieces of metal of the same height as leads, and made to the same lengths. They are, however, much thicker than leads, being cast to the bodies of type; thus there are clumps of the thickness of nonpareil, brevier, long primer, pica, &c.

Stereotype clumps are cast for the purpose of surrounding pages of type. They will be described hereafter.

Clumps are sometimes made with letters or words on their upper surface to distinguish the nature of the type matter to which they are applied, or the name of the compositor by whom it has been set up. (See Composition.)

Clumps are also made of brass, like space lines, and these are very much more safe and economical in use than the common ones.

When the lines to be spaced out are very long, such as those of placards, leads could not be conveniently used, and for this purpose a description of space lines called *Reglet* is made.

Clumps are called slugs in America.

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Reglet is always made of wood, and ought to be of the same height as leads. It is made in *lengths*, consisting of three feet, and sold in dozens; that is, dozens of yard lengths. Its thickness is that of the regular bodies of type; thus there are pearl, nonpareil, brevier, long primer, pica, english, great primer, double pica, two-line pica, two-line english, and two-line great primer reglet.

An inferior kind of reglet is sometimes sold, which, besides being of unsuitable wood and imperfect finish, is less than the proper height, thus causing the matter to get off its feet. The use of this sort of stuff is very wasteful, both in regard to time and material.

Reglet is generally cut up to the size required by the printer himself, with the aid of a saw. It is much more economical and convenient, however, to get it cut up to em measures by the printer's joiner—a practice which is now becoming quite usual.

Lengths of wood similar in every respect to reglet, except in their thickness, which is greater, are called *furniture*, or *wood furniture*, in contradistinction to metal furniture. Furniture is used for purposes quite apart from the spacing out of lines, as will be seen hereafter; but as it is so analogous to reglet, the present seems to be the best opportunity for noticing it.

It may, therefore, be said that this prepared wood or reglet, if of a thickness greater than two-line great primer, is furniture. It is sold in *lengths* of three feet, and each piece is of the same height as reglet.

The different kinds of wood furniture are—

Double broad	equal to	8	pica ems	in thickness.
Broad and narrow	,,	7	,,	,,
Double narrow	,,	6	,,	,,
Broad	,,	4	,,	,,
Narrow	,,	3	,,	,,

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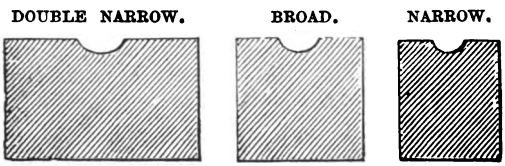
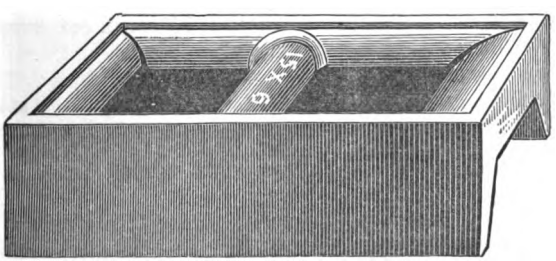


Thicknesses of Wooden Furniture.

Wooden furniture, like reglet, is preferably cut up to sizes by the printer's joiner.

Metal furniture, properly called French furniture, is used for the same purposes as wooden furniture, to which it is greatly superior. It is differently formed, however, and made to different sizes.

Metal furniture has a deep groove or angular furrow on its top and bottom surfaces. Its height is that of an ordinary lead. At intervals the furniture is completely perforated with round or oval holes, which serve to prevent water accumulating, and conduce to lightness. The French have introduced a much improved form, which is now generally adopted in this country. An illustration of this furniture is appended.



This form, while it is much more elegant, is very much lighter than the old kind, and at the same time equally strong. Although slightly more expensive in the first instance, it is more economical in the end, and much more convenient generally.

The breadth of metal furniture is different to that of wooden furniture, and it is reckoned in pica ems. The

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improved furniture has the breadth and thickness plainly stamped upon it, as seen in the illustration. This saves much time in avoiding the necessity of measuring any sizes as to which the compositor may be in doubt.

Metal furniture is now always supplied to certain lengths, which are regular multiples of the pica em, and it does not require to be cut up in the printing office, a reform that has only taken place within the last forty years.

The maximum width of metal furniture is ten pica ems. The lengths run to fifty ems.

Quotations are large hollow quadrats, and used sometimes in the place of metal furniture.

They appear to have been at first used to justify side-notes or quotations in book work, and were called "quotation quadrats." This use has long since passed away, and they are now simply hollow quadrats, used for filling up considerable spaces at the beginning and ends of chapters in book work, and also in job work. Formerly they were cast to two sizes, broad (4 em) and narrow (3 em), but they are now made to the following sizes:—

Great primer, 2 em, 3 em, 4 em.
Double pica or two-line small pica, 1½ em, 2 em, 3 em.
Two-line pica, 1½ em, 2 em, 2½ em, 3 em.
Two-line english, 1 em, 1½ em, 2 em.
Two-line great primer, 1 em, 4 ems pica, 1½ em, 2 em.
Four-line pica, 4 × 2, 4 × 3, 4 × 4, 4 × 5, 4 × 6 em.

To enable the compositor to make curved lines, *curvilinear quadrats* are employed, which are of the same height as ordinary furniture. The lnner furniture has a convex surface to make a circle, and the outer a concave surface. The type is placed between, and the angles outside may be filled with type or the ordinary rectangular quadrats. The use of this furniture will be described hereafter, under the heading of Composition of Curved Lines.

Curved lines are frequently made by other appliances, as will be seen when we are treating of Composition.

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CHAPTER VIII.

IMPOSING SURFACES—Side and Footsticks—Quoins—Chases: News, Book, and Folding—Slip Chases—Locking-up Apparatus—Rack—Chases—Machine Locking-up Chases—Mallets—Shooting Sticks—Forme Carriages.

THE *imposing surface* is a metal-plate secured on the top of a strong wooden frame. Its face should be perfectly smooth, otherwise it will wear away the types which are moved over it.

Formerly, imposing surfaces were made of stone, chiefly slate, owing to its smoothness and capability to take a good polish, and the word "stone" is even now applied to the surface generally, although it no longer describes its material. Thus, to lay matter "on the stone" is to place it on the imposing surface.*

The metal of which the imposing surface is made is usually iron, but steel is preferable, as it does not rust so soon, and has, when planed and polished, a smoother surface. The cost, however, is much more than that of iron.

Whatever be the material adopted, it is necessary that the surface be absolutely level, and in setting it up the spirit-level may be employed.

The thickness of the plate varies according to its superficies, from half-an-inch in the case of steel to an inch in that of iron. An inch and a half is the usual thickness of a slate. So that if the plate is strong enough, its thickness is not material.

Around the edges a slight indentation, about an inch in breadth and a pearl in depth, is sometimes made, to rest the end of the galley on when type is being transferred from the "stone" to the latter. This plan is chiefly adopted in offices where one description of galleys only is employed; where a variety of galleys of different thicknesses is used, the indentation is not advantageous. The extra quantity of metal which it requires should also be taken into consideration.

* The meaning of "imposing" will be explained hereafter.

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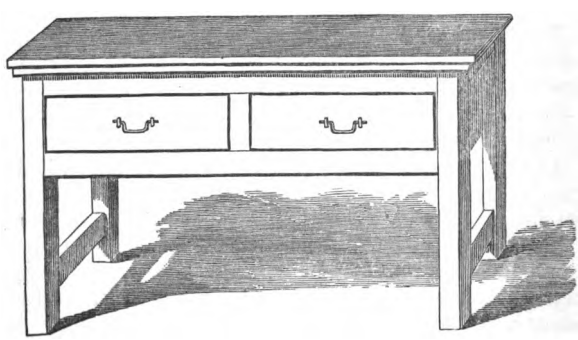
The imposing surface is mounted on a frame, usually three feet in height, although this varies in different offices, some printers preferring a higher stone than others. A low stone is more convenient when formes have to be lifted on to it; but in correcting formes it involves much stooping on the part of the workman, and the type on it is not so near his eyes.

The superficial area of the imposing surface varies, according to the class of work to be done on it and the available space in the printing office. The usual sizes made are:—

Royal	2	feet	6	inches	long	by	2	feet	broad	
Dbl. Crown	3	,,	0	,,	,,		2	,,	2 in.	broad
Dbl. Demy	3	,,	4	,,	,,		2	,,	4	,,
Dbl. Royal	4	,,	8	,,	,,		2	,,	3	,,
News Dbl. Ryl.	4	,,	0	,,	,,		2	,,	7	,,
Treble Royal	6	,,	0	,,	,,		2	,,	7	,,
Four Royal	8	,,	0	,,	,,		2	,,	7	,,

The frame should be of good yellow deal, and substantially put together with strong screws and nuts.

The space underneath the surface may be utilized in various ways. As shown in the illustration, there may be



drawers fitted up to contain quoins, furniture, mallet, &c.; or a galley or forme rack may be fitted up in it. If drawers are adopted, they should be on good oak runners, and be so

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arranged as to be drawn out both in front and at the rear of the frame, to avoid the necessity of having to walk to the opposite side to open them. For this object stout iron handles are fixed both to the front and back of the drawers.

Forme racks underneath imposing surfaces are objectionable, as the "locking-up" and "planing" of formes cause much vibration, and tend to loosen the type in the chases.

Side and Footsticks are pieces of furniture of a wedge shape. The mode of using them will be described hereafter.

Formerly they were always made of wood—hence called "sticks;" but now they are very frequently made of iron.

Wooden side and footsticks are supplied by the printers' joiners in "lengths" of 36 inches, or cut up to certain sizes, according to the dimensions of the job in which they will be used. Iron side and footsticks are made generally of wrought iron, and to specified sizes. Cast iron is used when the name of the firm to which they belong is stamped in them.

The thickness or height of footsticks and sidesticks should be that of the ordinary furniture.

A small *saw-block* and *saw* are required in every printing office, for cutting up furniture, reglet, &c. In some offices a small circular saw is used, which does its work quicker and better than the ordinary hand-saw. It should be fitted up with a treadle to actuate the saw, and the top should be contrived so as to allow of wood being cut at various angles. If a common saw is used, it should have a strong brass or steel back.

For securing the matter, or "locking it up," *quoins* are used. They consist of small, wedge-shaped pieces of wood, and when applied to the sidesticks make two parallel outer surfaces.

Chases are iron frames which enclose pages or formes of type. The principle on which they are made will be seen from the diagrams on pages 64, &c.

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Chases are, in height, somewhat lower than furniture. They are made of either *wrought* or *cast* iron. The former, from its superior strength, is preferable to the latter, but cast iron may be employed for smaller sizes, and when the chase is in one piece and has no movable parts.

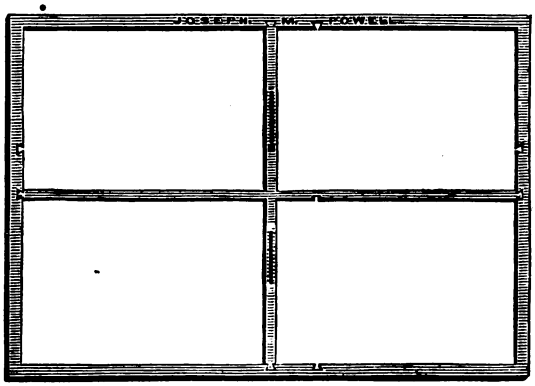
Chases are of three kinds—"book," "news," and "jobbing."

Jobbing chases are merely rectangular iron frames. *Broadside* chases are those which are the full sizes (without cross bars) of the several sheets, such as demy, royal, double crown, &c. *Job* chases are the folio, quarto, and octavo, &c., of either of these sizes. *Heading* chases, very long and narrow, are adapted for type used in printing the headings of account books, &c.

Long narrow chases, called *slip chases*, are also used for such jobs as play-bills. They are usually made to the following sizes:—

Demy Long Folio	24	by 8
Double Crown ditto	31½	by 9
Double Demy ditto	36	by 10½

Book Chases, which are sold in pairs, are made with cross bars, as shown in the diagram below. If the cross



is fixed, they are generally cast, but if movable they are wrought. Movable crosses consist of two bars, having

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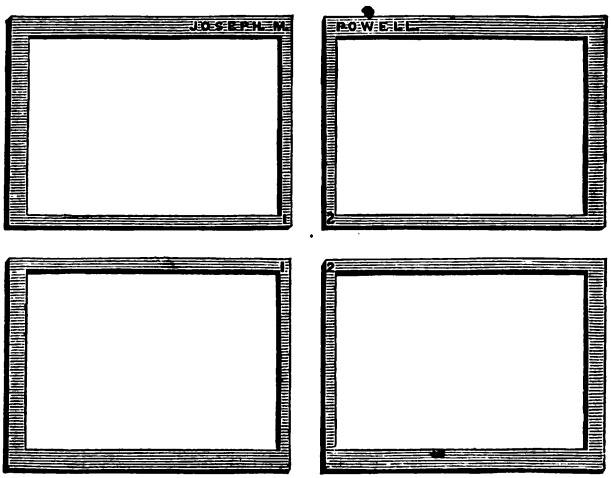
projections which fit into slots in the chase, as shown in the diagram. These are fixed in one or other of the pairs of slots, according to the nature of the forme to be imposed. As they appear in the illustration they are set for 4to. or 8vo. If the short bar is shifted the chase is used for 12mo.; if the long bar, for 18mo.

The most usual sizes of bookwork chases are the following:—

Double royal octavo.....	38 by 26	inches	inside
Double demy	36 by 24	,,	,,
Double crown	32 by 21½	,,	,,
Double foolscap	29 by 19	,,	,,
Super royal	28 by 21	,,	,,
Royal	26 by 20½	,,	,,
Demy	24 by 19	,,	,,
Crown	21 by 17	,,	,,
Foolscap	19 by 15	,,	,,

News chases are made to suit the size of the journal for which they are required. They are made in sets of two



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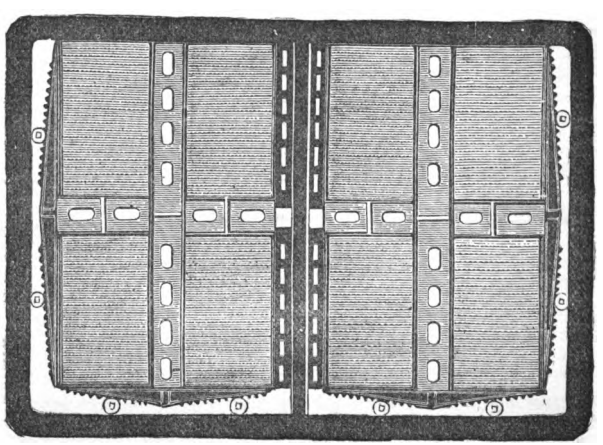
or four, and are of the shape shown in the diagrams. It will be seen that the sides are of two thicknesses, being stronger and thicker on the outside edge than on the inside. When the inside edges are brought together their combined thickness is only equal to that of the outside edges. This thickness, which forms the margin in newspapers, may, however, vary according to circumstances.

Chases of this kind are called *folding chases*. They are sold according to weight, and should always be of wrought iron.

To obviate the use of movable quoins and side and footsticks, a number of *locking-up apparatus* have been invented from time to time. None of these, however, bids fair to supersede the old system, for a good quoin and furniture well adjusted and properly tightened is, after all, the securest fastening for a forme. Some of these inventions consist of little wheels running on notches in the sidestick. They are worked with a key, and the more they are revolved the more do they tighten or loosen the forme, as shown in the diagram. The key is inserted in the orifice, and the locking-up may be done by simply turning it with the hand.



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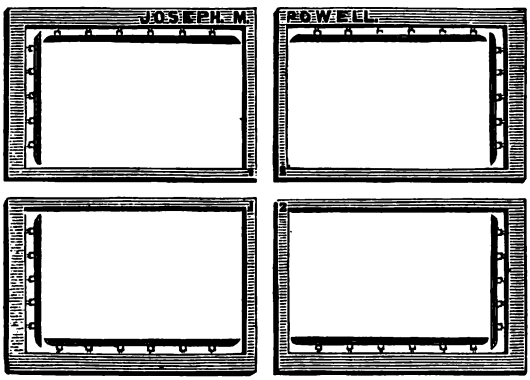
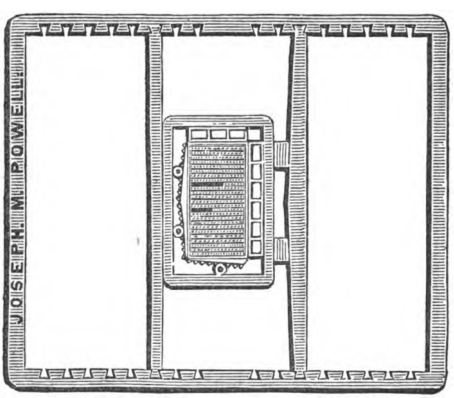
Newspaper folding chases are, however, also fitted up with screws and nuts, projecting from the side thus :—



It is only necessary to turn these nuts to tighten the forme.

Rack chases for fixing small formes on presses are made the size of a press table, and obviate the use of furniture. In these the sides are racked to admit of two bars, which



can be placed at any required distance apart. One bar is wedge-shaped, to answer the purpose of a sidestick, and to be used with quoins.

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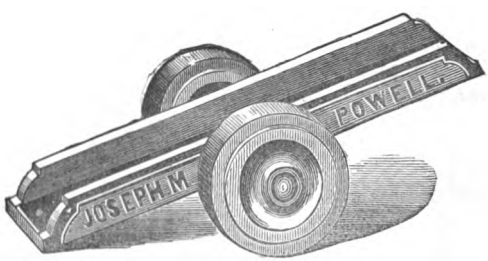
These chases are also adapted for securing formes on the beds of machines.

The quoins are tightened by being driven in the necessary direction by the use of the mallet and shooting-stick.

The *mallet* is an ordinary wooden hammer, somewhat similar to that used by carpenters.

The *shooting-stick*, or shooter, transmits the pressure from the mallet to the quoin, which could not conveniently be struck by the mallet.

To convey formes to the press room, or from one part of the composing room to another, *forme carriages* are



made, as shown above. These are also called *trollies*. The wheel should have a rim of vulcanised india-rubber, which enables the carriage to travel about noiselessly, avoids sudden shakes from any inequalities in the floors, and permits of the whole being twisted round with great ease.

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CHAPTER IX.

THE COMPOSING ROOM—Arrangement of Windows—Artificial Illumination—The Compositor's Candlestick—Mineral Oil Lamps—Gas Fittings—Heating—Ventilation—Communication with the Press Room—Disposition of the Printing Materials—General View of the Operations of the Composing Room.

WE have now described the types and the various appliances for composing them—from the cases in which they are kept before being set up to form words and sentences, to the chases in which the formes are locked up preparatory to being printed at the press. Before showing how these various appliances are actually used, or, in other words, before passing to the subject of Composition, it may be desirable to point out how the different materials referred to are best disposed in the office, and to offer some remarks on the construction and arrangement of the composing room itself.

The composing room should always be a separate branch or department of the printing office. Even in the smallest office a portion of the available space should be partitioned off and reserved exclusively for setting up the types. This may not always, at first sight, appear an economical direction, but experience of a large number of offices, of all sizes and descriptions, has convinced us that it is the best, and in every way the most advantageous arrangement, to isolate the composition entirely from the press and other work. A compositor is required, perhaps, more than any other kind of artisan, to rivet his attention upon the work in hand, and the moment his attention is diverted an opportunity is made for an error. Besides this, composition is, or ought to be, pre-eminently a *clean* operation; press-work is necessarily a dirty one. When the two are brought together, both are made alike unclean, the types are generally allowed to get into a dirty condition and do not work well, the copy and the proofs are soiled, owing to the pervading dust; while the vibration, which is unavoidable where presses or machines are worked,

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tends to make disorder by throwing down letters and lines of type in sticks, or on galleys or imposing surfaces. Beyond this, the two classes of workmen—pressmen and compositors—are so distinct that they do not always agree together. There is a general disposition to have things belonging to the composing department lying about the press, and things belonging to the press department lying about the cases, with a constant tendency to disorder and untidiness. It should always be remembered that there is hardly any bad habit so wasteful and irritating in a printing office as untidiness; the first law of the printing office *must* be "a place for everything, and everything in its place." *

If the printing office consists of a building containing several storeys, the composing room should always be on the uppermost floor. The reasons for this are obvious. The prime necessity in a room of the kind is abundant light, and light is generally obtained to the fullest amount at the top of a building. There will be also less vibration and less noise when the room is removed from the street, than in any other situation, both of these conditions being conducive to the comfort, convenience, and expeditiousness of the compositor.

The natural *lighting* of the room may be vertical, by means of skylights or a glass roof, or lateral, by windows, or both expedients may be adopted. However the lighting may be arranged, it should not be excessive in quantity, but should be capable of adjustment, by means of shutters, blinds, or awnings. The idea of blinds in a printing office may appear to many as somewhat fanciful, but it is in reality a thoroughly practical and necessary one. Too great a flood of light, owing to the unavoidable blaze of sun-heat in summer, is very detrimental to sight and bodily health. We have known offices, planned by the most eminent architects, whose instructions were to

* To conduce to this order, and facilitate ready access to any of the multifarious tools and materials used in a printing office, it is advisable to have all cupboards and covered receptacles properly labelled with the names of their contents. Cases in racks may not only be labelled, but a printed specimen line of the type may be pasted on the outside edge, and to ensure the cases being always returned to the same place, they should be numbered, with a corresponding number on the upright of the rack.

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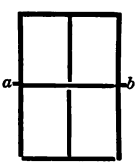
pay every attention to the comfort of the men, that were absolutely oven-like in summer, owing to the deficiency of means for moderating the sunlight, and the men engaged in them left their work with blanched faces and faltering steps, very painful to witness. All sorts of expedients are resorted to in similar places to obviate the inconvenience, principally that of pasting up the windows with white paper, or of making paper curtains, suspended by strings. The loss of time and material entailed by this necessity should suggest to any employer of judgment the importance and the economy of attending properly to the lighting arrangements of his office.

The best window-frames are those in one piece, not those that are double, sliding up and down, as in dwelling houses. *Many* small windows in a printing office are better than a few large ones, and the small window-frames should, preferably, each have a few large panes rather than more small ones. Let the window be of this shape:—



At *a* and *b* are two projecting pieces which enable the whole to *swing* as on a pivot. They fit on incisions in the wall-framing of the window. The moment a window of the kind is opened, it is opened top and bottom, there is an opportunity for the escape of the polluted air as well as for the entrance of the fresh air, and there is an avoidance of the draught which the common up-and-down frames cause when, as is commonly the case, only one of them is opened. A sloping ledge of wood will prevent the window being carelessly swung too far back. In arranging the plan of lighting, pay particular attention to avoiding all *dark corners* as much as possible; they conceal dirt, wasted material, and all kinds of irregularities. The light should, if possible, be always on the left-hand side of the frame.

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Printing offices require artificial light, as the work is to a certain extent done more or less in the absence of daylight. The best kind of illumination at present available is undoubtedly gas, but electricity is now (1883) being gradually introduced. Sufficient experience has not yet been acquired to enable us to speak positively of its advantages.

Before the invention of gas and the introduction of the mineral oils now so largely used in our households, candles of tallow were exclusively employed. The candlestick had a very heavy base, and this was fixed in the lower-case *c* box, or was so constructed as to fit tightly into one of the boxes above it. "Compositors' candlesticks" of these kinds are still sold by printers' brokers. A good tallow candle should be used in them—wax candles and the best substitutes for them are too expensive, while the so-called "composites," although they do not require snuffing, are a nuisance, for the material gutters and splashes among the letters near it. Paraffin oil requires a peculiar burner and lamp, and it is a matter of difficulty to adapt the latter to the ordinary case; otherwise this oil gives a better light than candles. The high glass chimney necessary to cause the current of air is always in the way of the hand in moving to the upper-cases, which is an objection. In American country offices, where mineral oils are chiefly burnt, a convenient lamp-holder is used, consisting of an arm and a circle at the end to hold the lamp. The arm fits tightly on the top rim of the upper-case, and the circle is fitted in such a way as to enable the lamp to be placed over the lower-case on either side of the upper-case. Something of the kind, if introduced into this country and the colonies, would probably command a good sale, especially as printing offices are being established in places where gas is either very dear or unobtainable. In the absence of such an arrangement, the old-fashioned compositor's candlestick is, next to gas, the best mode of lighting.

We cannot enter into the subject of gas fitting, further than by saying that there should be a separate gas branch over each frame, or if two frames are placed side by side,

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as is usual, one branch, if pendant and shaped thus ⊥, will suffice for two. If the frames are back to back, of course the one branch will light two sets. There should be a separate burner for each compositor, disposed in the centre of the case, above the thick middle vertical bar dividing the caps from the small caps or over the *c* box, which is preferable. The branch should be a foot above the top ridge of the case. The best burner is the atmospheric or "argand;" it has a number of small holes in a circle. A paper shade, white inside and green outside, should be used to concentrate the light on the copy and the case, and to diminish the glare on the compositor's eyes.

In all well-ordered offices it is a standing rule that no gas be lighted with spills of paper, and infractions of this are visited with fines. There is nothing more dangerous in a printing office than to light gas with a bit of screwed-up paper and then to throw it on the ground, to be perhaps only partially extinguished. Wax tapers ought to be supplied for the purpose; they are safest and cheapest in every way, and, indeed, it is well to make one person responsible for lighting and extinguishing the whole of the gas burners.

The lighting of the room being provided for, its *heating* should be attended to. Some offices are warmed by hot air or hot water, others by open fire-places or gas stoves. In some (too many, alas!) no provision whatever of the kind is made, and the men are compelled either to warm themselves at intervals by the brisk exercise of throwing the arms about in the manner of cabmen, or to light the gas, perhaps, in noonday—in either case causing a loss to the employer, which in a very short time amounts to more than would provide a proper heating apparatus. Into the comparative merits of heated air and water, or gas and coals, we cannot enter here, as they do not properly belong to the printing art. We would remark, however, that, besides being the most cheerful, and perhaps most healthful, the open coal fire is useful for drying formes, which is occasionally necessary in every office.

Neither can we enter into the question of *ventilation*—the next point to be considered. Whatever system is

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adopted, it should be *ample;* for a composing room usually contains several occupants, and these frequently are compelled to work many hours in succession. The ventilation of some of our best offices is most imperfect, and the stench—we can use no other word—which is encountered in entering them any morning, after much night work has been done, is almost unbearable. It is the unwholesome conditions under which printing is at present very largely carried on, and not the business itself, which make it such an unhealthy one. There are offices which are familiarly known in the trade as "slaughter-houses," so noxious is their influence on the health of the unfortunate workers in them. If the committees of the London compositors' sick funds were to publish, along with the list of persons who receive sick grants, the names of the offices at which the men worked, and how long they worked in them, many people would be astonished at the recurrence of certain names that are now only to the initiated of evil omen.

Besides the ordinary communication between the press room and the composing room by means of staircases, there should always, if possible, be a lift or hoist, for the purpose of conveying formes up and down. It may be a hoist of the dimensions of an ordinary apartment, worked by steam power, or it may be a mere orifice in the floor, through which, by a pulley and rope, a forme may be let through. Compositors are not well adapted by their sedentary operations to carry heavy formes up and down stairs, and so carrying them often causes the formes to be broken. If the stairs, however, must be resorted to, a little tram should be run down the right side of the staircase, and the chase slid down the groove.

We now come to the arrangement of the frames, racks, imposing surfaces, &c., in the composing room. The diagram on an adjoining page will assist to explain our meaning.*

* Those who are fitting up large offices may derive useful hints from the accounts given of the vast establishments of Messrs. Cassell, Petter, and Galpin in the *Printers' Register*, August, 1875, and of Messrs. Waterlow and Sons in the *Printers' Register*, November, 1875. These articles describe both the architectural and the internal arrangements of the buildings, the lighting, warming, and ventilation, allocation of the various departments, &c.

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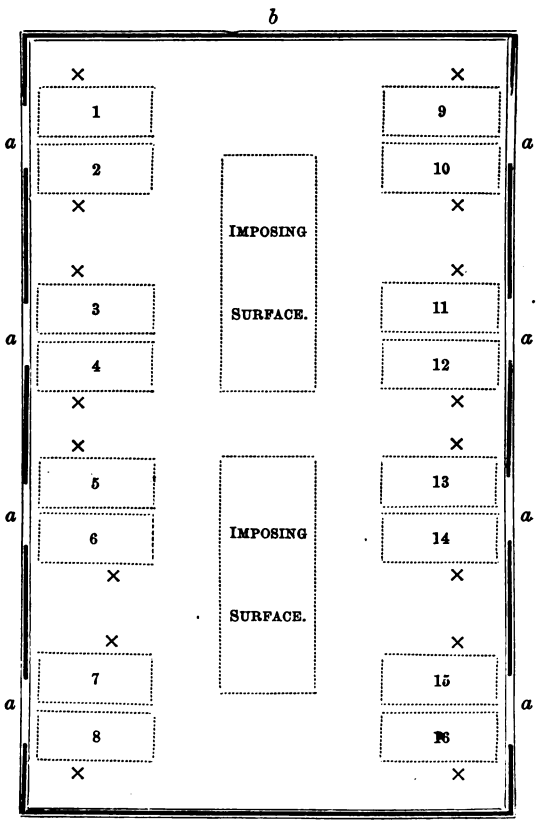
This diagram is intended to represent the arrangement of a room having eight windows, which are marked *a*. In planning the composing room, everything depends on



the position of the windows, and the space must be appropriated after the frames have been set in the proper position; that is, the position which ensures to all the

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greatest amount of light.* The frames, of which there are sixteen, are marked with Arabic numerals, 1—16. They are placed in pairs, back to back, at right angles to the windows; thus each frame gets a fair moiety of the light from each window. The frames, of course, are not placed close together, as the cases overhang slightly at the back. The space between each pair of frames, for instance, between 2 and 3, 4 and 5, 6 and 7, is called the *alley*. The compositors stand in the position marked by small crosses (×).†

In the centre of the room are placed the imposing surfaces, as marked. They have a clear passage around them.

At the end of the frames, and slightly extending into the passage around the imposing surface, will be placed bulks, if necessary.

These arrangements are especially applicable for news and book offices; if a quantity of large poster type is used, some of the frames may be removed to make way for wood letter racks, or whatever kind of receptacle the wood type is kept in. Otherwise the wall *b* may be fitted up with shelves for large letters.

Leads and furniture may be kept in various manners, already described; if on shelves, the end walls afford convenient positions. In large book offices these materials, with brass rules, &c., are kept in a special room called the *store-room*, by the store-room keeper, from whom the compositors receive them, and to whom they have to return them when done with.

Let us now take a general view of an office fully fitted up and in working order, as it would present itself to the eye of a novice in the art. We will include as many

* Of course, wherever practicable, it is best to arrange the frames so that each compositor has a left-hand light. Where this plan is adopted, advantage may be taken of the available space at the back of each frame to obtain room for a galley rest, to be used by the compositor at the next frame, for an italic double case, for a shelf or two for standing matter, or any other convenient purpose. There are not, however, many printing offices in which room can be spared for such an arrangement.

† Frequently in newspaper offices two compositors work in one frame, an italic frame for general use being placed between the imposing surfaces.

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technical terms relating to *materials* (not to processes) as possible, without explaining them, and advise the young reader to pause as he comes across each one, to ascertain if he understands its exact meaning. If he does not, he must refer back to previous chapters.

The workmen, or *compositors*, stand before the respective *frames*, on which are laid, in a sloping position, the *cases*, from the *boxes* in which they are setting up the *types*. They hold in their left hands their *composing sticks*, in which are the *setting rules*, and with the thumb and first finger of the right hand lift the letters from the cases, and transfer them to the composing stick. The copy is before them on the case; they follow it with their eye and pick out separately every letter, point, or sign required to represent its meaning. In this manner they finish a line of type; then, after properly spacing it out, or "justifying" it, they remove the rule to the front of it, as it is convenient to set up the next line against. So they go on, till the "stick" is filled with a number of lines. The matter is then deftly lifted on to a *galley*. Stickful after stickful is placed on this galley, until it also is full. Then the matter is fastened up on the galley by means of *side-sticks* and *quoins*. It is then taken away and an impression of it pulled at a press, corrected, and is ready to be made up into a forme in a *chase*, with *furniture*, *foot-sticks*, *side-sticks*, *quoins*, *&c.* The quoins are driven in with the *mallet* and *shooting-stick*, after the forme has been smoothed down with the *planer*. After this is done, the forme is taken away to the press room, and the compositor has nothing to do with it until it is brought back to him, when the full number of copies have being worked off. He unlocks the forme, takes out the furniture, clumps, rules, &c., everything, in fact, except the lines of type, which he puts again on his galley, and distributes every single character back to the exact box from which it was originally taken, where it is ready for the next job.

This is a rapid, superficial account of the work of the compositor. His work includes, however, a large number of exceedingly delicate processes, requiring long train-

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ing, much manual dexterity, quickness of eye, and clearness of brain. How to perform these processes in the best and most expeditious manner will be the subject of the next chapters—viz., *Composition*.

CHAPTER X.

THE PRACTICAL ART OF COMPOSING—The Compositor—How he should work—Learning the lay of the Cases—How to set up a Head-line.

COMPOSING is the art of arranging types in such order, that when inked, and pressure is employed, they form, on paper or other material, such words and sentences as may be required. The workman who performs the operation is called a *Compositor*.

Composing is also called "type-setting," a compositor is a "type-setter," and literary matter duly composed is said to be "set up." A case of type which has been nearly exhausted by being composed is referred to as being "set out." Indeed, in the everyday language of the printing office, the two-syllable word "compose" is nearly always superseded by the simpler monosyllable, "set," as, "set it in long primer." We sometimes hear of "picking up stamps," and the Americans talk of "type-slinging;" but neither is a very dignified expression, and will be used only by those who admire slang.

We shall pursue the same plan in describing the process of composing that we have already adopted in describing materials. We may suppose that the reader knows nothing whatever about printing, yet is desirous of knowing all that can be imparted by direction and precept. We would caution him, however, on the threshold of this operative section of our work, that mere reading and study cannot possibly render him a good workman; they must be supplemented by patient and protracted practice. Written instructions may point out to him the best way to go to work, and may save him from many bad habits which experience shows young printers are liable to acquire, but they can do little more. Their usefulness, though circum-

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scribed, is, notwithstanding, very great; so we shall at once "begin at the beginning," and in the simplest language at our command endeavour to lead the reader onwards to the most complicated branches of his business.

The beginner should select a frame that is suited to his height. It is all important that he should learn not to stoop over his work. The pulmonary weakness of compositors is usually owing to the contraction of the chest induced by bending the body over a low case. Stooping, too, is a habit that, if once acquired, is seldom or never got rid of. Especially do we urge young girls—some of whom may adopt this work as a handbook to the printing business—to *stand up straight*, or they will be unable to retain either their health or their good looks.

On the other hand, the frame should not be too high, or the compositor will be compelled to throw out his arms or to stretch himself to such a degree that he will be unnecessarily fatigued, and his energy will become exhausted before his working time is nearly expired. Neither will he be able to work with such dexterity as he would if the frame were properly proportioned to his height.

Reference has already been made to this subject on page 41; but as a general rule it may be taken that the height of the frame should be such that the front bar just reaches the compositor's elbow. Any difference more or less must be neutralized by raising the case or elevating the compositor, by putting a box or board under his feet.

Before we go any further, we would offer another caution. Let the young compositor not, at first, trouble himself about *speed* in working. If he does everything he has to do properly, speed will come naturally; but if he seek it by doing things carelessly, he will never attain the maximum of rapidity, while his work throughout will be of an inferior character. In learning any art, the first steps are of paramount importance: "Well begun is half done."

The preceding paragraphs will have suggested the three chief qualifications of a good compositor—that he does what is required of him with EASE, with EXPEDITION,

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and with ACCURACY. The man who cannot pursue his vocation in this manner is a trouble alike to himself and his employer.

Now place a lower case moderately filled with letter on the frame, laying it down gently, otherwise the types will be jerked out of their boxes, or get into those of their neighbours. Take up an upper case and place it on the frame, higher up than the lower case. The two will slope, desk fashion, but the upper one will be inclined more than the lower, as provided for by the top back bar of the frame.

In taking a case out of a rack, draw it out only a few inches—say half-way. Then grasp it by the sides, not by the top and bottom. The direction may seem unnecessary, but we have known beginners to require being so instructed.

If the cases are in their proper position, the first thing to do is to learn the "lay." Several plans have already been given. Go carefully over the different boxes, and see if their arrangement corresponds with that first described in our pages; if there is any variation—and the probability is that there will be—note it particularly, or you may make serious mistakes.

Here we may initiate the reader into the signification of a word which is, unfortunately, very frequently required in the printing office, but which we have not as yet had occasion to mention. It is "pi," or "pie," the spelling being various, and it signifies types in the wrong place or in the wrong condition. If a case is violently shaken up, and the letters get into wrong boxes, the case is said to be "in pie;" if composed matter gets thrown off its feet and into a state of confusion, it is "pie." A little heap of letters, spaces, and quads will be called "pie." To get anything into "pie" is to get it into disorder and confusion, and the amount of "pie" there is in an office is the gauge of the regularity and care of the workpeople engaged in it, and of the system under which it is managed.*

* Floor-pie is, as the words indicate, pie made by letting types fall on the floor of the office and remain there.

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In taking a general survey of the letters contained in the respective boxes, it will be noticed that some of them are either alike, or appear so to the inexperienced. Thus a small-capital o appears similar to a lower-case o; but if the one were used for the other in printing, the difference would be at once apparent. The same may be said of the cipher 0 and the capital letter O; the small capital v and the lower-case v; the small capital w and the lower-case w; the small capital x and the lower-case x; the small capital s and the lower-case s. As already stated, it is the custom now to give those small capitals liable to be thus mistaken, an extra nick on the back of the shank.

Owing to the form of the letters being necessarily reversed in the types, there are some of them which may confuse the beginner. They are the n and the u, the p and the q. He should mark carefully the difference, and will soon learn to know "which is which." The experienced compositor detects the difference instantaneously, and almost as if by intuition.

The young compositor must, at the very outset, accustom himself to read the types upside down*—that is to say, in such a position that the nick is uppermost. The reason for this is, that in the English and most of the other languages, the lines are read from left to right, and types being necessarily set up in the composing stick in a similar order, they have to be placed there upside down, or the impression taken from them would read from right to left.

There are several ways of crossing the "pons asinorum" of the young compositor; that is to say, "learning his cases," or "learning the boxes." He may learn them by

* Several typographical reformers, who have not possessed a practical acquaintance with printing, have proposed that types should be composed with the faces downwards in the stick, the types having an impression in intaglio of the face on the foot of their body, and this impression being of the direct form which the type would make on the paper. If this plan were adopted, the compositor need not read upside down, or the reverse way. The types of Major Beniowski, which attracted so much attention a few years ago, and those of Col. Tomline, shown at the London Exhibition of 1872, were of this description. Any one who trains an apprentice, or whoever learns the art by himself, will notice how slight is the difficulty which amateurs lay so much stress upon, and how soon the reversed form and arrangement become as easily read as the ordinary one. The advantages of setting types in the ordinary way, over those proposed by inventors such as we have named, are simply incalculable.

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rote, from a plan, such as we have given, or he may learn them experimentally, by actually beginning to compose. Our own experience leads us to the conclusion that the latter is the better one, but it is advisable, for several reasons, that a printed plan of the lay of the case that is adopted should be given to the beginner.

In some printing offices, however, boys are taught to compose in a different manner to that upon which we are now entering. A handful of letters is given to them, and they are told to put each in its proper box in the case. When they can do this with some degree of readiness, they are shown how to "distribute;" that is, they are given a portion of regularly composed matter and told to return the different types of which it is made up into their respective places in the case. We hold that both of these plans are injudicious. In the first place, they tend to get the cases into "pie," for mistakes must occur, and every letter deposited in a wrong box requires, at the cost of some trouble, to be taken out again, or it results in an error which must be rectified when the process of composition begins. Beyond this, there is good reason for first making the young compositor acquainted with the *constitution* of the matter he has in hand, with its component parts, and the manner in which they have been brought together. This he can only do by actually setting it up, by putting the letters in position, with the necessary spaces, points, and the other types which are used in making lines and sentences.

Let him, therefore, be at once provided with a piece of reprint* copy, and be shown how to set up one line. The preliminary operation of "setting the stick to the measure" should be done for him.† It is advisable that a

* *Copy* is the literary matter to be printed. It is of two kinds—manuscript and reprint. Manuscript copy is written with the hand; reprint is copy that has already been printed, and in that form given to the compositor.

† "Setting the stick" is adjusting the space between the slide and the head, so that the line of type composed between them will be of the proper length. The slide must be unloosed, and pica quads to the proper number required set in the stick; then the latter must be tightened up again. Leads or rules may be used as gauges instead of pica quads, but they are not generally so trustworthy. The measure should be a little wider than the quads, so that they can be easily lifted out; if it is very tight, and leads are used, the locking up will not secure the matter as firmly as is desirable, as the leads, &c., will "bind." These points will be understood better after the reader has gone through this and the succeeding chapter.

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type of a moderate standard, such as long primer or bourgeois, should be given to him at first. A smaller letter is inconvenient to read and to handle; the ability to work on such small type as nonpareil should be left as an after acquirement.

Having got your cases in position (we take up the colloquial style, on account of its directness and simplicity), and your copy resting on the lower bar of the upper case, over a portion of that side occupied by the small capital letters,* take up the composing stick in the left hand. Grasp it firmly, yet lightly, in the hollow of the hand, the thumb extended so as to rest on the end of the slide. The stick must be sloped so that a letter may rest against the slide on one side and the flange on the other. Now take a lead of the proper measure and put it into the stick, close up to the flange.† Follow it with the setting rule, but this must be so arranged that the neb, or ear, is away from your body, and projecting over the head-piece of the flange. You are now ready to begin setting up the copy.

We will suppose that your copy begins thus:—

JOSEPH M. POWELL, LONDON, E.C.

Here is a line composed entirely of capital letters and the necessary punctuational points. The first letter is J, so with the forefinger and thumb of the right hand pick that letter out of its box and place it in your stick, with the nick uppermost. Acquire the habit of turning the letter, during its journey from the box to the stick, so that it will be in its proper position when it arrives there. Try to select from among its fellows, at a glance, the exact letter that you intend to pick up; the slightest hesitation causes a loss of time, which, multiplied by the number of times the hand travels to the boxes in the course of a day, is a very serious affair. Let the stick follow the right hand, to some extent, so as to diminish the space to be traversed before depositing the type. If these simple directions are

* This is not in all cases the best position for the copy, as will be shown hereafter.

† Experienced compositors work without the lead, but it assists beginners in emptying their sticks.

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followed, and resolutely adhered to, the art of setting type will be readily and pleasantly acquired.

The next letter is O; place that in the stick like the J, and then do the same with all the succeeding letters till you have put in the H, being careful all the time that the stick is not held in such a clumsy position that the types fall down. You will notice now, that between the H and the first letter of the next word (which is here *abbreviated* down to its initial) there is a blank. This must be made by inserting a *space*. In the line that is being set up, the space seems equal to an en quad. Insert an en quad, and then set the letter M, after which place the full point, and then another en quad, then on to P and the rest of the letters. Between the E. and C. of the contraction of East-Central district there is no space; the full point alone is used. This is always done where the contraction consists of more than one letter to represent only one term. Thus, the degree, Bachelor of Arts, is set B.A., and manu-scriptum (manuscript) M.S. At first you must notice how the words are composed, and imitate the original; afterwards you will set them mechanically in the proper manner. People who think they are acquainted with all the peculiarities of the language are often surprised, when they come to learn to compose, how many things there are that they never noticed before.

When the line is all set up, you may fairly claim to have started on the road that leads to a complete knowledge of practical printing. But what a long journey has yet to be taken! For instance, you will find that the line does not fill up the space in the stick. That space is called the measure, and it is always adjusted according to a certain number of pica ems, just as leads and rules are cut, as has already been described. Your line is "short," and it requires to be exactly in the middle. In order to show you what is to be done, we will require you to fill out the line with em quads. Probably it cannot be exactly filled with them, and leaves an empty space, but that does not matter for our present purpose. There is room for seven ems, and these, equally divided between the two ends, would leave three and a-half or three ems.

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and one en for each. Instead of putting three separate or single ems, put in a two-em quad and an em quad at each end. You might put in a three-em quad at once, but that would not illustrate the principle we are now about to lay down. In doing this, follow the rule always acted upon by a good compositor, and let the largest space be on the outside. Thus the two-em quads should be at the two extremities; next to them, inside, the em quads, and for the same reason the ens will come another remove inside; in short, as the thinnest space, it will be nearest to the type. If the line is still slack, or loose in the stick, try what sized space would tighten it. If an en quad, then take two spaces and place one at each end, always remembering to have the smallest space nearest the type. The reason for this precaution is twofold; the thinnest spaces being the weakest, are most secure inside, where they are protected by their stronger neighbours, and thin spaces at the extreme end would be very inconvenient to handle when several lines are composed, and be liable also to slip out of their places.

Perhaps, after all, the line is "loose," although one thin space would make it tight. You are afraid of putting this in at one side lest the line should not be in the middle, and look one-sided. Well, if all your ingenuity in devising spacing at each end is exhausted, you *may* give a little more on one side. But let that side be the one opposite to the side which contains the full point at the end. The latter itself causes the line to have an appearance of being slightly one-sided, and the odd space may be inserted at the other corresponding end without detracting from the appearance of the work.

You have now learned to set up a line. In book or newspaper work it would be called a "head-line;" in jobbing work a "displayed" line; in either case, to distinguish it from a line of text or "*run-on*" matter, the composition of which will be the subject of our next chapter.

Before beginning the next line, run your eye over what you have done. See that all the letters are turned the right way; that none are standing with their feet where

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their faces ought to be; that all the nicks are turned in the same direction, so that they form a continuous groove through the entire line.* See that the types are straight upright, and close up to the composing stick throughout their length; that the space between the words is all alike; and that the largest spaces in the margins are outside and the smallest inside. If all these points have been attended to, the line is as well set as anyone could make it, and you are ready to begin another, of a more complicated character.

CHAPTER XI.

COMPOSING—Composition of a Common Paragraph—Indentation—Spacing—Rules for Spacing.

THE young compositor is now acquainted with the principle of the art of type-setting, but is able to apply it only to the most rudimentary description of work. In the present chapter we will endeavour to render clear to him the system upon which work of a somewhat more complicated character is to be done. We will suppose that the following is the first portion of the copy:—

All communications connected with the Literary portion of the *Register*, including New Books and Novelties sent for notice, should be addressed to the editor, at his office.

Before picking up any of the types for this line, remove the setting rule from the back of the first or title line already in the stick (see last chapter), and place it at the front (or against the nick side of the types), so that it may be at the back of the second line. It is only necessary to set a few types without a rule to perceive the convenience of one.

Notice that the first line of the paragraph (compositors abbreviate the word to "par.") is shorter than the two following, there being a white space at the beginning of it. This is called an indentation. The space is equal to that

* It is not, however, necessary, in practice, to keep the spaces and quadrats all turned the same way, but to show the principles of composition, the learner may be told to place them in the same order as the type.

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of an em quad, and must be obtained by using one; hence the line is said to be indented an em.

It may here be conveniently stated, although doing so is somewhat discursive, that a paragraph set up like that before the reader is called an ordinary or common par. If the relative length of the lines were altered, by the first being begun at the commencement of the line (it would then be said to be "full out" or "run out"), and the second and the following lines were indented, the whole would be a "hanging indention," because part of the first line would hang over the succeeding ones. To set a paragraph in this style, the compositor would be told to "run out and indent." This is an example of the valuable use of technical terms; the two words indicate with perfect distinctness what, without them, would take several lines to describe. An exact acquaintance with the technical terms of the trade conduces very much to the progress of the beginner. But he should always *think* over their simplification; there is a meaning, not always at once apparent, but certainly attached to, every phrase and word of the kind that is current.

The compositor will place the em quadrat fairly in his stick, with as much care as he placed the letters in the line already set up. He will then set the capital A, and the two ll's which follow. Of course he will only put the latter in one by one, and not try to place the two at once. He will then put in a thick space to divide the word "All" from the word "communications" that follows. He will proceed in the same manner in setting the remainder of the line.

Now, when the last word in the line, which is "the," has been set, the line will be short. The line already set was short, but it was not required to be long. It had only to be placed in the middle, and the remaining space was easily filled up with quadrats, &c. This line must be "full out;" how is it to be made so?

There are three ways of making the line of the full length. One is to put more letters in, that is, to include a portion of the following line. Part of the word *Register*

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would fill it up. But there are certain laws which cannot be altered, that bear upon this part of the business. In the first place, whenever a word is broken or divided, a hyphen must be inserted to indicate the fact. Place the hyphen at the end, for the sake of an experiment, and it will be found, perhaps, that there is room for the R.* It would not do to let this letter stand alone at the end, and to begin the next line with *egister*. That would be unsightly, inconvenient for reading, and contrary to the laws of syllabication. These latter laws we will refer to presently. The least we could do is to "get in"—a technical term again, which is amply explained by its present connection—the syllable *Re-*. We will suppose that this is impracticable, that there is no room for the *e*. The line must be a full one; how is it to be made so?

The least consideration will show that the line can only be made full by putting a wider space between the words. This brings us to the important subject of *spacing*.

Spacing is the art of putting the proper spaces between words, with a view to securing the most symmetrical appearance, while making the line of a proper length. In poetry every line differs in length, and all that is necessary is to get the words as far apart as will give to them a neat and orderly appearance. But in prose matter, which is "run on"—another technical term—like that in the paragraph now to be set, the lines must all be of one length. This uniformity of length is obtained by the use of spaces of various thicknesses.

The compositor has ready to his hand the following spaces—the hair space, the thin space, the middle space, the thick space, and the en quad, which in this respect may be regarded as one of the spaces. It has been previously stated that a one em quad is equal to two en quads, or three thick spaces, or four middle spaces, or five thin spaces. This should be impressed upon the mind, and the relative thicknesses of the spaces to each other will be understood. The art of spacing is simply this: ascertain

* The experienced printer will perceive that we are only assuming some of these details for the purpose of making clear to the young compositor the mode of acting in certain contingencies.

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how much space there is at the end of the line, and divide that between the number of words to be separated. If there were an opening equal to two ems to space, and eleven words in the line, ten thin spaces would be used, in addition to those already inserted. If with the same vacant space there were only seven words, thick spaces would be used, for six of them would just extend the line to its proper length.*

It is by this means that modern printers render all their lines uniform in length. The early printers did not trouble themselves about this particular, and the beauty and symmetry of their pages suffered in consequence.

Spacing requires some ingenuity and some thought, and the most careful attention should be paid to it by the young compositor. When he has mastered the principle involved, all the rest is a matter of calculation and judgment. He will put in more or less space according to the exigencies of the occasion. He may have to take out his thick spaces and substitute thin ones to "get in" a few extra letters; or he may have to put in thicker ones, or to add thin ones to those already in use. We will not give a table of the relative proportions of the spaces to each other, as it would be better for a beginner to calculate for himself, and on his readiness of calculation much of his speed in composition will depend. It is just like dividing a sum of money equally among a number of persons, each of whom is to have the same coins; if there were a pound to distribute between ten persons, each would get a florin and receive his full allowance: if the pound had to be divided among only eight persons, each would get a florin and a sixpence, or half-a-crown. So in spacing. †

* We do not, however, recommend the use of a thin space with a thick in ordinary work, the remarks above being intended to show only the principle involved. Instead of a thick and thin in five places we would put a thick and middle in two, and an en quad in three, which would measure the same. Of course we would choose the best places for each sort, according to a rule to be stated presently.

† As we have already stated, the hair space is not always of uniform proportion to different bodies. It varies in thickness in different bodies from seven to ten to the em. It is, however, desirable to use as few as possible of these spaces. They are so thin that they are easily bent or broken, and careless compositors soon use up all the apportioned quantity of them to a case. They are really very seldom required; a little calculation will show how to avoid them altogether, in most cases, by using at some part of the

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The appearance of all composition depends greatly upon the character of the spacing, and there are certain rules laid down for the purpose which must never be infringed.

Rules for Spacing.—First: There must be, as far as possible, an equal space between all the words in a line. This need not *actually* be the case, but only *apparently*. For instance, there may actually be less space between o and d than between l and h, yet the apparent space will be the same. Example:—

Motto denotes will have

A thin space divides the first two words, a middle space the second two, yet the spacing appears nearly the same.

Long parallel upright-bodied letters always require more space between them than those which are curved and short. Where there is an overhanging kern, as f, at the end of a word, if the word next to it begins with a short letter, less space is required than when a long full-bodied letter follows, and *vice versâ*. If a comma is placed after a word, the space following may be less than between words with no such point. This leads up to another rule.

Secondly: The spacing after the grammatical and rhetorical points varies, in order to conduce to the apparent uniformity of the whole. In this country we do not put a space before the comma, whereas on the Continent they always do so. We put in a space, for instance, between the word and the semi-colon, the colon, the note of interrogation, and the note of exclamation, as the case may be. The following is a general rule in regard to these, subject, however, to the exceptions that will hereafter be specified:—

Before the , . - ' and) no space.

Before the ; : ? and ! a thin or hair space.

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line, without detriment to the general appearance, one or two spaces rather thicker than the rest, the extra thickness being equal to the hair space. Besides the spaces enumerated, in America they have a so-called "patent space," which is in thickness midway between a thick space and an en quad. We have never seen a space of the kind used in this country, but are inclined to think that it would be convenient. Practical printers, however, are very reluctant to increase the number of pieces in their cases, and with very good reason.

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After the , . - ' a *thin* space if the general spacing is with middle spaces, a *middle* if with thick spaces.

After the ; :) ? and ! a *thicker* space, generally, than the rest of the line.

The latter direction is acted upon, not for the purpose of securing uniformity in appearance, but because a short break should, it is thought, be left after an ordinary phrase.

These rules require for their observance not only discretion and calculation, but taste, on the part of the compositor, and show, if it were needed, that setting up types is not the mere mechanical operation that persons unacquainted with its intricacies might imagine.

It should be distinctly understood, however, that these rules are not inflexible. They are often impracticable; sometimes objectionable. Especially when the lines are short, or the letters very wide, must the observance or non-observance of the rules depend upon the judgment of the workman; the spacing must then be governed by necessity.

The spacing, in short, must be uniform in appearance throughout the line, except that at the close of some phrases a little wider space may be permitted. If the line cannot by any exercise of ingenuity be uniformly spaced, it may be a little wider in the *middle*.*

In poetry a thick space is generally used throughout; but if the lines are wide apart or leaded, more space will be required, according to our next or *third* rule.

In setting the example of copy chosen for this lesson, we directed the young compositor to begin with a *thick* space. This space is, in fact, generally used for the purpose; it may be said to be the *normal* one. But if the matter of which this line was the commencement were *leaded*, a thicker space should be placed between the words. Hence

* Large types, such as those used in placards, are spaced by putting furniture, quotations, reglet, leads, or even pieces of card, between the words, according to the space required.

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Rule Third.—The spacing between the words must be regulated proportionately to the space between the lines.

Solid matter—that is, matter which has no space or leads between the lines—is to be less widely spaced than matter that is "open" or leaded. If in one case thick spaces were used, in the other en quads would be used. Here, again, the judgment and taste of the compositor find an opportunity for their exercise. As much as an em space may be used when the page is very large, the type large, and the lines very open. No exact rule can be given in regard to this requirement; much must be left to the judgment of the compositor. To cultivate the taste, let him carefully study good examples of printing; these are accessible enough at the present day, when so much fine work is done by the large houses in London and the country.

In ordinary book-work no pains whatever should be spared to ensure good spacing. We would impress this upon the young beginner, and advise him from the outset to determine to do his work in this respect as well as he possibly can. In hurried work, such as on newspapers, good spacing is almost impossible, and the appearance of it suffers accordingly. Sometimes great "holes," or "pigeon holes" as they are called, are seen between the words of a newspaper paragraph, but how unsightly they are! In a book house they would be avoided at any cost of time or trouble.

The compositor should not space up his lines so tightly as to make it a matter of difficulty to take them out of the composing stick. Nor, on the other hand, should they be very loose. If too loose, two evils will be experienced; the lines will not appear uniform in length, nor can they be easily "lifted" out of the stick. If all have been spaced to an uniform length, the stick may be emptied, a dozen or more lines together (in the way that we shall describe hereafter) almost as safely as if the whole consisted of one piece of metal. Careless compositors often thrust in spaces by main force, with a bodkin or a piece of rule. The result is that the space is broken in half, one part of it only remaining between the words. Besides

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this, it is a matter of great difficulty to get the lines out of the stick afterwards, and if all are not equally tightly spaced, the probability is that some will drop out in the process.

The rest of the paragraph needs but little remark. After each line take out the setting rule and place it in position for beginning another.

The word *Register* is set in italics; these letters must, of course, be got from the italic case; if there are words in small capitals, these are to be got from the upper case of the Roman in which the whole is being composed.

At the end of the paragraph there is a very large blank. This is to be filled up with the aid of quadrats, beginning with four ems, and then using lesser ones and spaces until the line is the same length as the rest. The compositor must in this case remember the direction given in regard to the display line selected as the subject of the last chapter, and place *the smallest spaces nearest to the type.*

The present chapter will, we hope, have shown the reader how to set up in a proper manner any ordinary kind of "straightforward" composition. It will also have shown him, we trust, how to do this in the most tasteful manner. It will have disabused his mind of the error that a compositor is a mere "picker up" of types, or a "type lifter" as some persons regard him. All the rest he must learn for himself, by thought and study, and by the imitation of good examples.

When a learner can set an ordinary paragraph from reprint copy, he should be given a paragraph of manuscript copy. This will exercise his faculties in a way that he perhaps did not expect. There are a multitude of details connected with composition that never render themselves apparent to the ordinary reader, and the compositor does not find them out till he comes to put together all the different types. If inexperienced, he should have a carefully and tastefully printed book (and books of this kind are now very cheap and common) beside him, and refer to it from time to time. It is surprising how profitable is a little study of this kind.

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CHAPTER XII.

COMPOSITION—Division of Words—Emptying the Stick—How to become a Good Compositor—Habits to be Acquired; Habits to be Avoided.

THE two preceding chapters were intended to instruct the young compositor in the method of setting up a display line and a common paragraph. If he has thoroughly understood them, and reduced them to practice, he will now at least be able to undertake any kind of ordinary composition. We intend presently to give full instructions for each variety of the more complicated work that he will encounter; but, in the meantime, we may claim to have already initiated him into the *rudiments* of the art of type-setting.

Division of Words.—One of the first difficulties encountered by the young compositor consists in the necessity of dividing words which will not completely come into the line. Part of a word, perhaps, requires to stand at the end of a line with a hyphen after it, and part at the beginning of the following line. It would not do, for the purpose of completing the line, to use just as many letters as would fill it up, for there is a series of regulations on the subject (called Syllabication) which must be followed. The early printers avoided much trouble of this kind, for they either divided a word arbitrarily, or contracted some of the other words; indeed, the oldest books have lines of irregular lengths. We dare not do this at the present day, and the question then arises, Upon what principle are words to be divided? Many writers have treated this subject at great length, and two different schools have arisen, founding their systems on etymology and pronunciation respectively, and presenting a long array of rules (and a corresponding quantity of exceptions) for the guidance of printers and writers. The present treatise aiming chiefly at being *practical*, any considerable space devoted to orthographical and etymological discussions would be altogether misapplied. All that falls within our

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province is to state plainly a few useful directions which will exemplify the principles upon which rests the art of dividing words.

Our first advice, however, to those about to divide would be simply "Don't." If you can prevent it by altering the spacing, do so; but the spacing should not be glaringly different to that of preceding and following lines.

If divisions are absolutely necessary, let them be as few as possible, and these few as carefully and correctly made as you are able.

Two successive lines ending with a divided word are unsightly, but three should never be permitted, except in very narrow measures. A divided word should never end a page.

A division that leaves but one letter at the end of a line or at the beginning of another is not permissible.

Subject to these reservations, words may be divided thus:—

First.—A consonant between two vowels belongs to the latter syllable.

Second.—If there are two consonants together, one goes to the first syllable and the other to the following one; unless they form part of one sound, when they must not be divided.

Third.—You may divide a prefix from a word or an affix, providing the root is left entire.

There are exceptions to these rules, many more, in fact, than there ought to be, owing to the pedantry of some authors and correctors of the press; but for most practical purposes they will be sufficient.*

Emptying the Composing Stick.—A little before his stick is completely full of lines of type, the compositor must empty it. This is a rather delicate operation, and one that always troubles young compositors. If it be not properly done, the matter will probably be squabbled, or

* A number of useful rules on this subject will be found in Southward's "Dictionary of Typography," 2nd Ed., pp. 25, 26.

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fall into pie. Set up a galley on the frame on your left hand. The head should be towards you, and the side with the bevel against the lower ledge of the case. This is done, of course, that the types may be supported, when on the slope, by the head and lower side of the galley.

Now set down the composing stick on the lower case in such a manner that the lines may run at a right angle to the front of the lower case. Place the setting rule in front of the last line, and a lead of the same measure as the stick behind the first line. Experienced compositors need not use the lead, but beginners should, for safety, always avail themselves of its protection. Raise the two hands, and partially close them by bringing the tips of the fingers within about an inch of the palms. Open the thumbs and first fingers a little, preserving the other fingers in the same position. Press the two bent second fingers against the right and left side of the type respectively, and clutch it at top and bottom between the first fingers and thumbs. You will find that you have a firm hold of the type, which will be supported on all sides. Raise it up gradually, but without hesitation, disengaging the stick by thrusting it away with the little fingers of the left hand. As soon as possible, turn the mass of type in such a manner that the lines may be on the top of one another, that is, all rest upon the first line, secured by the lead. Bring the whole to the galley, retaining your tight hold of it all the time, and then place it on the galley against the head and sides. If this be done carefully, not a single letter will have dropped out. It is a good plan to practise by lifting out, first one line, then two, then three, and so on until the whole stickful can be lifted out with confidence.

After a little practice, the top lead may be dispensed with, but then the matter should be turned the other way, so as to rest upon the bottom line and the rule.

Place the letter on the galley, or "drop it," to use the technical term, as close to the head as possible, and then push it right up. A lead and a quadrat or quotation may be put at the foot of it to protect the bottom line.

The difficulty of emptying the stick will be materially

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increased if the lines have been set too tightly. On the other hand, if they have been set too loosely there will be also great difficulty in emptying the matter, as some of it will be likely to drop out. In either case the importance of careful setting and proper justification will have been manifested.

It is a good plan for the young compositor to read over each line in his stick before he commences a new one, and to correct any error which he perceives he has made. This may be conveniently done while justifying the line. Many compositors read over their matter on the completion of every stickful, believing that to do so is a safe and economic practice, saving much time in correcting after a proof has been pulled. Others dispense with this reading in the stick altogether. We need not here enter into the discussion as to which is the preferable course, but we lean decidedly to the plan of reading in the stick ; it saves, at least, much time to the corrector or proof reader.

We will conclude this part of our subject by advising the young compositor to do his work carefully, deliberately, and thoughtfully. It is the most profitable plan in the long run, and from the beginning is the most pleasant and satisfactory.

In order to follow up the directions that have been given, it will be necessary to practise diligently. Nothing but this will impart dexterity ; all the technical instruction in the world will be useless without it. Just as a person cannot acquire the art of swimming from attending to the instructions of a master and without going into the water, the compositor cannot learn his trade by simply reading the directions of a handbook, however explicit and practical it may be.

There is one important matter we would impress upon the reader at the outset, and that is to aim at *good* work, rather than *much* work. Let him pay attention to accuracy, and expedition will come of itself. Now, in order that he may begin in the right way to become a good and really competent artisan, we would point out that there are, first, certain Habits to be Acquired, and, secondly, certain Habits

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to be Avoided. We will not enlarge upon the subject of habits generally, nor show how easily bad ones are learned, and with how much difficulty they are broken off. In this respect all habits are alike, and what applies to the others applies with especial force to the business of composition. A bad habit, arising from silly affectation, servile imitation, or even from indolence, at the commencement of his practice, sometimes requires years of irksome restraint to be overcome, and frequently is never overcome at all, and the character of the man and his work are alike rendered indifferent.

Habits to be Acquired.—First and foremost, a quiet and thoughtful manner. In the printing office it is due to your neighbours that you should be quiet; it is due to yourself that you should be thoughtful. Composition exercises the mind as well as the body, for while you are picking up the types you must read and spell the words which they form. This cannot be done properly while you are either talking or thinking of something else; hence silence at work is one of the first rules of a well-conducted printing office. "A still tongue makes a full stick."

Second.—A good position. Something has been said on this point already, but it cannot be too pointedly enjoined on the beginner, for the inevitable result of inattention to the direction to stand upright will be the impairment of his health. Let the compositor consider that perhaps a fourth of his life may be spent in one attitude, and then he may realize how important it is that that attitude should be the proper one.

Third.—Select every type before you pick it up. The types in the boxes will be found to be in all possible positions, but before you extend your hand to take one out, look at it, and note how it lies. Then, by the finger and thumb, and in the course of its passage between the box and the stick, turn it so that you may drop it in its proper position into the destined place for it.

Fourth.—Put each type quietly into the stick, with the simplest motion possible. The wrist should be brought into play in doing this; the elbow should not be bent at all for the purpose.

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Fifth.—While putting the letter into the stick, look out for the next; the thumb of the left hand, meanwhile, keeping the letter upright in the composing stick.

Sixth.—Let the left hand, containing the composing stick, follow the right hand, engaged in picking up the types. We do not mean that the left hand should traverse the case literally from the l box on one side to the em quad box on the other, or vertically from the top boxes of the upper-case to the lowermost of the lower-case, but in a direction backwards and forwards over the latter, so as to save the largest amount of travel for the right hand. If this point be kept in mind, the meaning of our direction will soon be understood, and its great utility recognized.

Bad Habits to be Avoided.—Every movement of the hands or other part of the body that does not directly facilitate the process of composing should be shunned as needlessly wearying to the system, and consequently lessening its productive power. Such are, bending the body, setting the legs apart, and needlessly inflecting the elbow. Some compositors make a bow to their cases every time they extract a type; others contract a habit of dipping the hand containing the type on its way to the stick. Such habits are as wasteful of time, and unnecessary fatiguing to the body, as they are ludicrous, and at once indicate defective training, or indolence and affectation. Specifically, the bad habits of compositors are:—

First.—Clicking the letter on the side of the stick, once or twice, before putting it into its place. This is sometimes done by boys in order to make it appear that they are doing more work than they are really capable of, and they thus get into a bad habit that never, perhaps, leaves them.

Second.—Making two attempts to pick up the letter out of the case. In an article on the secrets of fast type-setting, in an American journal, the following sensible remarks appeared on this point:—"A determination not to make any false motions, however fruitless it may at first appear, will in a day or a week visibly increase the number of ems set; that is, by sighting the nick before the

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hand goes out to pick up the type, so that when it is taken up by the thumb and forefinger there need be no necessity for turning it round to see where the nick is, the arm meanwhile making a false or lost motion that would have sufficed to bring another type into the stick. These false motions not only consume time, but become chronic, and increase in number and intensity, so that some men fairly shake themselves to pieces, and only set perhaps five or six hundred ems an hour. We have known men who acquired this nervous, jerky style in setting type, and making two or three motions for every type secured, almost entirely rid themselves of the superfluous shakes by adopting a slow and measured style, apparently unremunerative at first, but which gradually quickened into systematic speed. We therefore consider an avoidance of false motions essential to fast type setting." *

Third.—Do not look at your copy too long or too often. Endeavour to take away from it in the memory just as much as can be retained until all the types that compose it are set up. The more, of course, the better; but any uncertainty, necessitating another examination of the copy, is a loss of time.

Fourth.—Do not use a guide to indicate the place in the copy at which you are working. If you look at any picture of a mediæval compositor, you will find on his upper-case an apparatus called a *visorum*, extended over the copy. Its use was thus described in Moxon's "Mechanick Exercises" (1683): "Pricking the point of the visorum, most commonly upon the border or frame of the upper case, on the left hand, compositors fold the leaf of copy they compose by so as the bottom of it may rest upon the square shoulder

* Houghton ("Printers' Every Day Book"), writing about thirty years ago, enlarged upon this idea as follows:—"Let the time of picking up a letter be equal to the time of counting two, and bringing it to the stick equal to one, counted at the same rate. If a compositor would extend his hand as if composing, and hold it so while he counts two, and again bring it back in the time he could count one, the movement that I would explain and recommend as the best to secure lifting up every type would, perhaps, be better understood. Thus it will be seen, that to avoid missing any type when the attempt is made to pick it up, considerably the largest portion of the time of composing is occupied in securing it. It is immaterial at what rate the movement be tested, it will be the same relatively. This method of composing, once acquired, will doubly compensate for the trouble of learning it."

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near the bottom of the visorum; then, with two pieces of scaleboard tied together at one end, they clasp both the copy and visorum between these two scaleboards, which pinch the copy and visorum tight enough to keep the copy in its place, and at the same time also serve as an index to direct the eye to every line as the compositor moves it downward." Some modern compositors have a piece of rule or lead balanced by a light cord, to which a type or quotation is attached as a weight, and lay it upon the copy on the upper-case to assist them in "keeping the place." This guide, however, is in reality a drawback rather than an aid. The American journal referred to says:—"A peculiarity of most fast printers is their quickness of sight, enabling them to see from the corner of their eyes as well as directly in front of them. This readiness of sight is diminished rather than cultivated by keeping the eye strained continually on a point directly in front; and the time supposed to be gained in always having the place is more than counterbalanced by the time spent in arranging the guide. Besides, the effort to remember the place where he left off compels a man to carry in his head the sense of what he is setting, resulting in well-punctuated, intelligent work. We cannot, at present, recall a fast printer addicted to the use of a guide, while the very slow ones invariably use them."

The foregoing remarks have reference to the attainment of manual dexterity, but to constitute a good compositor, certain mental acquirements are indispensable. He should not only possess intelligence, but a reasonable amount of general knowledge, as well as some amount of good taste. He should be able to read his copy, especially if manuscript, with readiness, and to understand its meaning, in order to punctuate it properly. He should also be able to spell properly, as some copy is, in regard to the letters, almost undecipherable, while other copy is incorrectly spelled. An acquaintance with the contents of the current newspapers is very desirable, especially for the spelling of proper names.

General Hints.—The quadrats and spaces must be rigorously kept from pie. A convenient receptacle for worn-out

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or damaged letters, broken spaces, &c., is an old shoe, the upper part being cut away so as to leave the toe as a bag. It may be tacked against a wall or at the side of the frame.

The composing stick must be kept clean and bright; rust and dirt prevent proper justification.

CHAPTER XIII.

MAKING MARGIN—Importance of the subject in regard to the Appearance of the Work—The Use of Furniture—Proper Margins for Large, Small, Solid, and Open Pages—How to determine the Margin for any Sheet—Pattern Boards and their uses.

HAVING now described the rudimentary parts of the art of composition, we will proceed to treat the subject as it divides itself, according to the three chief branches of work done in the printing office, into Book Work, News Work, and Job Work, and to show the principles of each, in the order named. It must not, however, be supposed that there is any natural order in this arrangement, or that the compositor graduates from book work to news work, and from thence to jobbing. Nearly all depends on the character of the office in which the apprentice finds himself, or the peculiar circumstances under which he is "bound" to the trade. If he is brought up in an office where the three classes of work are done, he may reasonably expect to be offered some opportunities of practice at each; but this seldom happens, hence the use of practical instructions such as the present are intended to be, which will enable him to supplement the knowledge he has acquired of any one or more branches, by information concerning the others.

In treating of Book composition we will depart from the usual custom of stating at the outset the characteristics which should distinguish good work, and leave these to be exemplified under each of the different points which will come under notice. Regarded in this way, they will be more permanently impressed upon the memory of the

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compositor, and more clearly understood. We will begin with Making Margin, or, in other words, of determining the proper Dimensions of Pages. It is a subject of great importance, and one upon which will, to a large extent, depend the elegance of the book when completed.

A book may possess everything that is usually considered as essential to good typography—the type may be new and clear, the paper good and suitable, the composition careful and correct, the presswork irreproachably neat, yet if it has not exact, well-arranged margins it is a failure; the good effect of all the pains taken upon it is lost. "The use of furniture," says Fournier, "is undeniably the most important part of imposition, and that which requires the most attention; for the determination of the margins of a sheet is that which influences essentially the agreeable or disagreeable aspect of a book." Claye ("Manuel de l'Apprenti Compositeur") says:—"On the arrangement of the whites made by the furniture depend the good looks of the book generally; it is the one essential thing, for if the margins have been badly disposed, the work will have an offensive appearance, and all the labour bestowed on the other details will be absolutely thrown away."

We should here mention that some editions of books have unusually wide margins left for certain specific purposes. These are called "large paper" copies, and are very dear (in a double sense) to the bibliophile. They were originally produced in this style on account of the facilities they offer for annotation. Large paper copies of any book generally command large prices at sales. These, however, we must leave out of our consideration at present, and confine ourselves to the principles which affect the dimensions of the sizes of pages in ordinary editions.*

* This is a subject upon which the existing technical handbooks give little information. In 1872, Mons. J. Lechap contributed to *L'Imprimerie* a very valuable article on "Garnitures, ou principes de détermination des Marges," and in the year previously, Mr. Th. De Vinne wrote five long articles entitled "About Margins," for the (Philadelphia) *Printers' Circular*, which appeared in the numbers of that periodical for May, June, July, August, and September, 1871. As none of these articles have been republished, and they are practically inaccessible to many printers, we propose to avail ourselves of some of their very useful and carefully-compiled information.

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Making margin is defined to be the art of placing matter or pages in such a position that when printed in a sheet they will give the proper margin, as well as allow for the necessary "trimming" in binding the book. It is effected by using pieces of furniture of various sizes to separate the pages. The question of margin is, therefore, entirely one of *Furniture*.

As a general rule, solid pages have small margins, and leaded pages larger margins. The width of the margin increases with the width of the space lines, or the doubling or trebling of the leads. The page and the margin occupy something of the relation of the picture and the frame, and there should be a degree of proportion between them. The margin is governed to some extent also by the size of the type. A very narrow margin round a page of nonpareil may not be objectionable, but the same margin round a page of pica would be most disagreeable.

It is not possible, however, to vary margins with every change of type or variation of lead, nor to lay down inflexibly precise rules for the width of the whites of a page. It is sufficient to show how gross improprieties may be avoided, and how the best appearance may be obtained for each special work.

The average margin of a printed page should be equal to one-half of its entire area *when untrimmed*. This may seem to some an unduly generous amount of "white," but on measurement it will be found the usual proportion, subject to the variations above suggested.

The annexed table will show the usual margins for solid leaded, double leaded, and treble leaded matter. The solid page contains about twice as many ems as the treble leaded page, and the adding of every quarter inch to the margin diminishes the number of ems in the page about one-fourth. On the solid page but four-tenths of the white paper are devoted to margin and waste; on the treble leaded page seven-tenths are sacrificed:—

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	Solid Small Type.	Single Leaded.	Double Leaded.	Treble Leaded.
Size of Page in Pica Ems	27 by 46	24 by 42	21 by 38	19 by 34
Number of Pica Ems to a Page.	1242	1008	798	646
Size of Page in Square Inches...	34½	28	22⅛	17⅞
Size of Page in Linear Inches...	4½ by 7⅔	4 by 7	3½ by 6⅓	3⅛ by 5⅔
Width of Fore Margin in Inches, on the Leaf after Trimming..	⅝	⅞	1⅛	1⅜
Percentage of Area of Page to that of the Leaf	60	49	39	31

In calculating new measures and margins for pages of odd size or shape, the formula of half the paper for margin and half the paper for print will be found most useful for ordinary leaded work. By using this rule, all sizes of pages may be made up with accuracy, and a proper and uniform proportion may be maintained between the size of the page and the width of the margin, so that there will be a uniform increase with increasing sizes and a graduated diminution with diminished sizes. This can never be done when measures and margins are made by experiment and not by rule.

To calculate the proper dimensions of a page for a new or an odd size of paper, it is not necessary, however, to work out a mathematical proposition; for all practical purposes the following directions will be sufficient:—

Fold the sheet to be used for the forme with exactness, to the size of the leaf upon which the page is to be printed.

Find the width and the length (in inches or pica) of this leaf.

Multiply the length of the two sides together, which will give the square inches (or pica ems, if pica has been used as a measure) of the leaf. Half this number of square inches should be the superficial area of the page, if single leaded; about one-third, if treble leaded; and three-fifths, if solid.

To find this area, mark out with a lead pencil on the leaf the proper size and shape of the page as you think it should be.

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In marking off the size of such a proposed page, recollect that in binding, the leaf is trimmed on the fore margin but once in its width, while on the head and tail margins it is trimmed twice in its length. It is, therefore, necessary to make the dimensions of the pencilled page shorter in length than may appear proper at this stage.

Multiply together the two sides of the pencilled page. If the result of this multiplication is half that of the full leaf, the pencilled page is correct as to area.

To be correct as to margin, the page should be short in its length. The pencilled lines should be at a uniform distance from the edge of the leaf after allowance has been made for trimming.

If the result of this multiplication is more than half the area of the leaf, contract the lines; if it is too small, enlarge the lines. If the margin is irregular between the line and the edge of the leaf, after allowing for trimming, rectify the lines and repeat the multiplication as before.

The process is a little tedious, but not so much as it would be if done in another way; while it is practically as exact as could be desired. Whoever takes the trouble to use it will have the satisfaction of knowing that he is laying out his page correctly, that its width will be in true proportion to its length, that the margins will be exact and uniform, that page, margin, and paper are all adapted to each other.

Some may think this process an unnecessary waste of time. The old and skilful maker-up, we allow, may omit the details of the process, and trust to his trained eye to determine a proper margin, but the novice cannot work without a rule or system.

To make a book of satisfactory shape, with correct margins, it is necessary at the outset to procure a sheet of the paper that is to be used, and to fold it accurately to the size that is required. Besides being an unnecessarily indirect method of going to work, it is often extremely hazardous to decide on the page before buying the paper for the edition. It is quite a mistake to imagine that any size and description of paper can be bought without

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considerable delay, even in London. Either the page of type and the margins must be accommodated to the paper, or the paper must be accommodated to the pages by being cut down, the latter being a doubly wasteful procedure, both in time and material.* If the work is simply a reprint, or if the printer has received exact instructions from his customer to make a leaf of a certain size, no discretion is required to make the proper margin. If, however, the margin has to be "made," and the printer has had but little experience in such work, he should go to the binder and ascertain how much will be trimmed off the paper. He will probably find that on the head margin of an ordinary octavo, where there is a smooth folded edge, the width of the trimming will vary from a nonpareil to a pica. Let him then take a rule and lead pencil and mark a line about a bourgeois (the mean between pica and nonpareil) from the head. He will also find that the width of the trimming on the fore edges of the book (on which edge half the leaves are smooth and folded, and half are ragged and uneven) will depend on the condition of the edges and the folding; that in any case it will be one-half more than that of the trimming at the head, and may be more than double. For this reason, rule a line down the fore edge, about a great primer from the edge. The trimming at the foot or tail, where all the edges are usually of single leaves and ragged, will be about three times that of the head, and may be more. Rule, therefore, a line about half an inch from the tail edge, taking care by measurement to get the ruled lines square with a parallel ruler to the straight back edge.

These ruled lines indicate the largest size to which the book or pamphlet can be trimmed, and to this, in the absence of special directions to the contrary, the calculation should be made. If the margin is thought too large it can be cut down, but there can be no enlargement of a book that has been cut too small. As the ruled lines indicate the size of the leaf when it will be trimmed, they

* The preliminary selection of paper will also be of service to the printer in enabling him to decide how many pages he can work to advantage in one forme, what style of imposition he can use to save needless folding, and whether it is judicious to contract or expand the composition.

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will also serve as a guide for determining the proper dimensions of the page of type. If, as already remarked, the type is small and solid, a large page may be made; if the type is large and leaded, a small page.

Select the lead that will be used for the measure and lay it down on the leaf, midway between the back edge and the ruled line near the fore edge. Mark the paper at each end of the lead. The distance between this mark and the edge represents the width of fore and of back margin.

For the ordinary book or pamphlet, for which a uniform margin on all sides is desired, make marks on the paper at the same distance from the head and tail lines as there is space from the side mark to the front line. These four marks indicate the proper dimensions of the page, and it is only necessary to cut a gauge to the distance between the upper and the lower marks.

For any book for which an unusually large front and tail margin is desired, draw on the leaf ruled lines of the size of page desired, laying down the lines in the same position in which it is intended that the page shall be printed. Allow as much blank at the front or at the tail as may seem expedient, and then cut the gauge to suit.

The sheet that contains this pattern of the leaf and of the page may then be laid aside, but it will be useful for *making margin in the chase*,* to which we will now address ourselves.

As, of course, it would be too tedious a process to make a diagram of every page, take a sharp penknife, and on the ruled lines make occasional stabs (two on a line are sufficient) through the folded paper. There will be marked on every leaf the size of the page and its proper position. Then unfold the sheet, and the width between the stabs will determine with the greatest accuracy the proper width of furniture for every side of the page.

---

* We have thought it desirable to introduce this subject here, although it will not be understood by the young compositor who has only read the instructions already given. He may, therefore, pass by the point for the present, and revert to it when he has acquainted himself with some of the subsequent matter.

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The distance between the stabs at the head and the foot of the page (allowing one line more for foot white-line) will show the length of the gutter stick for the back margin; the distance between these stabs the proper width of that gutter stick. The length and width of the head bolts can be determined in the same manner. It is possible by this method not only to determine the width and length of the furniture for the head and back margins, but to cut the furniture before the pages are laid on the stone, and with a degree of accuracy that is not possible with any other method.

The width of furniture for the front and the tail margins can be calculated only after ascertaining the exact width of the cross bars in the chase. Deduct the width of these bars from the space between the stabs; divide the remnant left into two parts, and the proper width for the furniture next the bars will be known.

Of all methods of making margin this is the most exact, the simplest, and the quickest. If the calculations are properly made once, they never need be repeated for that size. Most pamphlets are made up to the regular folds of regular sizes of paper, and the binders have pattern boards to insure uniformity of size in their work. The printer, availing himself of this uniformity, should have a 4to, 8vo, 12mo, 16mo, and 18mo pattern for such papers as he uses. These papers and folds will give a variety of sizes equal to any ordinary requirements. It is advisable to first consult the binder, and get a series of patterns cut out of millboard, each of which shall truly represent the largest size to which the leaf can be cut in the practical work of trimming.

These patterns should be appropriately marked and carefully preserved. In making up, lay the board over two connecting pages (for instance, in an 8vo from over pages 1 and 16), and put as wide furniture between them as will allow the edges of the pattern to touch the edges of the pages of type. The space between indicates with precision what should be the true back margin for all ordinary centre-stitched pamphlets and plainly sewed and bound books.

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The pattern board is also useful in determining the proper size of a page of type in making up. When rule borders are used on pages, it is indispensable. On all odd and irregular sizes of paper the making of this pattern should precede all other work—even that of setting the type.

CHAPTER XIV.

IMPOSITION—Schemes for Folio, Quarto, Octavo, Duodecimo, and Sixteenmo Formes.—Half Sheets.—Leaflets.

WHEN sufficient matter has been composed to make a sheet or a half-sheet, according as may be directed, the compositor is required to *impose* the pages.

Imposing, or imposition, is the art of arranging the pages in such a manner that when printed and the sheet folded they will fall in proper numerical order.

Many pages of some previous trade manuals have been occupied with schemes of imposition adapted for a variety of formes, from folio to seventy-twomo, and even to double that. We do not propose to follow this plan, at least to such an extent, but rather to show the *principles* upon which the art of imposition depends, and which, once understood, will enable the compositor to lay down correctly any forme whatever with which he may be concerned. We begin, accordingly, with *Folio*, the simplest of all impositions.

Before the invention of letter-press printing, books (that is, the block books) were made up of single leaves printed only on one side. These leaves are called by bibliographers *Opistographic* leaves, from that circumstance. Among the leading features of Gutenberg's invention was the system of printing on both sides of the sheet, and leaves so printed are called *Anopistographic*. Further progress was made when a sheet was folded into two, making two *leaves*, or two *folios*, from *folium*, the Latin word for a leaf. Thus a folio consists of two pages, one on the front of the sheet and one on the back of it.

In England, and most other countries, books are printed

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so that the first page begins on the *right hand*, and throughout the book the odd pages, that is, the pages with an odd number for a numeral, are always on the right,* and those with an even numeral on the left.† This should be borne in mind.

Now, if you open a four-page tract, you will learn also that the second page falls at the back of the first, and the third at the front of the fourth. If you lay it down on a table with the first page uppermost it will be found thus :—

..... 4	..... 1 .....
.....	.....
.....	.....
.....	.....
.....	.....
.....	.....
.....	.....

and the other pages are, of course,

..... 2	..... 3 .....
.....	.....
.....	.....
.....	.....
.....	.....
.....	.....
.....	.....

when they are turned uppermost.

The forme containing the first page is always called by printers the outside forme, and that containing the second page the inside forme.

The impression from any arrangement of pages will, it is obvious, be the reverse of the order in which they are placed on the imposing stone. Hence, if we want to print pages which will read like the above, we must reverse their order. Accordingly, we place them thus :—

Outer Forme.		*Inner Forme.*	
1	4	3	2

This example contains the leading principle of the art of

* Hence called the "recto." † Hence called the "verso."

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Imposition, and should be thoroughly understood. *Why* is the fourth page imposed with the first? Because on unfolding the printed sheet of paper we perceive that both first and fourth pages are together on the outside. *Why* is the third page to the left and the second to the right? Because the odd page in books is always to the right, and, in imposing, the pages must be reversed—hence it falls at the left.

Notice also the sum of the two sets of numerals; 1 and 4 are 5, 3 and 2 are 5, and 5 is one page more than there are pages in the sheet. This is a most convenient thing to remember, but its use will be seen more plainly hereafter.

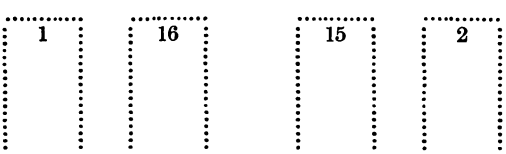
Folio sheets are sometimes required to be made up so that several of them may be folded within each other, or *quirewise*. They are intended to be stitched through the back, and are capable of opening very flat.

The mode of imposing folio sheets in quires is, in principle, the same as that already described. Each sheet consists of four pages; and these four pages are the first two and the last two in each sheet. Thus, if there be four sheets, or sixteen pages, the formes will be constituted in this way:—

1st sheet	will contain pp.	1, 2, 15, 16
2nd	,,	3, 4, 13, 14
3rd	,,	5, 6, 11, 12
4th	,,	7, 8, 9, 10

The first sheet will be imposed as a sheet of folio in two parts, the outer forme consisting of 1 and 16, and the inner of 2 and 15. The first and the last must be together because they are printed together on the sheet, and the next from each end, that is, 2 and 15, must make up the inner forme. The imposition, then, will be

FIRST SHEET.



Outer Forme. *Inner Forme.*

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Here again you will notice that the numerals of the pages which adjoin each other exceed by 1 the total number of pages: 1+16=17; 2+15=17, and the same rule would apply to all the other formes.

Imposing in quires may be carried to any extent by observing the following rule:—

1.—Ascertain the number of pages.

2.—Divide that number into so many sheets of folio.

3.—Lay down the first two and last two. These form the first sheet.

4.—Proceed in the same manner to the centre one, always remembering that the odd pages stand on the left and the even on the right, the folios of each two forming one more than the number of pages in the work.

Example:—A work consists of thirty-six pages, which is nine sheets of folio. They should be laid down according to the following scheme:—

	Outer Forme.	*Inner Forme.*
1st Sheet	1 36	35 2
2nd ,,	3 34	33 4
3rd ,,	5 32	31 6
4th ,,	7 30	29 8
5th ,,	9 28	27 10
6th ,,	11 26	25 12
7th ,,	13 24	23 14
8th ,,	15 22	21 16
9th ,,	17 20	19 18

It is obvious that in imposing in quires all the work must be composed before any forme is made up. This is a drawback to the frequent adoption of the plan.

Quarto.—A sheet of paper folded twice; that is, once across its breadth, and then once in a perpendicular direction down the middle, is said to be folded into quarto. Quarto sheets, therefore, contain *four* leaves, and if these are printed on both sides, *eight* pages. If you open an ordinary eight-page newspaper, you will perceive that the

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pages are, when printed, arranged thus, beginning with the side that contains the first page:—

.....	.....
.....	.....
.....	.....
.....	.....
.....	.....
.....	.....
..... 5	..... 4 .....
..... 8	..... 1 .....
.....	.....
.....	.....
.....	.....
.....	.....
.....	.....
.....	.....

Then if the paper is turned round so that the second page is uppermost, the arrangement is—

.....	.....
.....	.....
.....	.....
.....	.....
.....	.....
.....	.....
..... 6	..... 9 .....
..... 2	..... 7 .....
.....	.....
.....	.....
.....	.....
.....	.....
.....	.....
.....	.....

The pages of type must, to print in proper order, be reversed; hence the outer forme will be arranged so that 1 will be at the lower left-hand corner and 8 at the lower right-hand corner. Then as 4 is over 1, but with its foot turned round the opposite way, it goes above 1 in the imposition, and 5 necessarily stands above 8. The inner forme follows the same rule, hence we get the scheme for a *Sheet of Quarto.*

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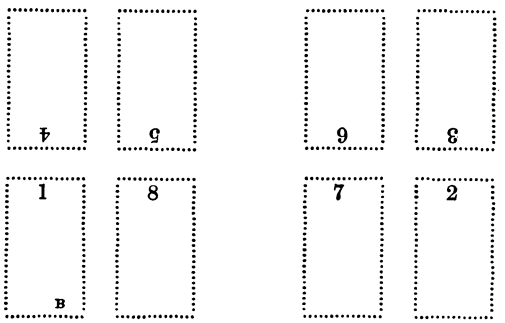
A sheet of quarto is actually two sheets of folio imposed quirewise, but locked-up in two chases instead of four:—

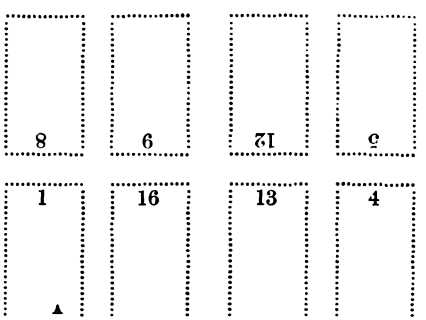
A SHEET OF QUARTO.



Outer Forme. *Inner Forme.*

Octavo.—A sheet of paper folded three times; that is, first, across its breadth; second, down the middle, perpendicularly; third, across the middle again, horizontally, will comprise eight leaves, and if each of these is printed on both sides, 16 pages. On account of making eight leaves, it is called *octavo*, which is also written 8vo.

A SHEET OF OCTAVO.



Outer Forme.

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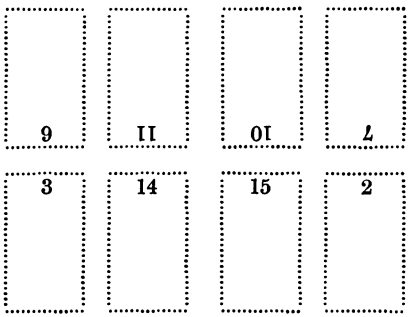
A SHEET OF OCTAVO.



Inner Forme.

This imposition follows the same rule as the previous ones do, and a little thought will soon solve any difficulty that may arise in regard to any part of it.

Before proceeding any further, we may give a "rule of thumb" for imposing formes, one that dispenses with any exercise of intelligence, and, therefore, commends itself to a certain class of workmen.

(1) Fold a sheet into the required number of leaves; (2) mark the number on each page, without cutting the sheet; (3) spread it out on the imposing surface. You will have the exact order of imposition if the pages faced the stone; but as they do not, it is only necessary to reverse them.

Twelves, or duodecimo, is a sheet folded into twelve leaves, making twenty-four pages. It is written 12mo.

This may be imposed in two ways: (1) by cutting off one-third, folding it separately, and insetting it quirewise in the remaining sheet of two-thirds; (2) by folding as an ordinary twelve-page number of *Punch* is folded.

In the first case, the sheet of twelves is a sheet of octavo with a quarto sheet within it. To impose it, make up a sheet of octavo in the 8vo part of the chase; that is to say, in the larger division of it, and a sheet of quarto in the smaller division, or what is commonly called the "off-cut."

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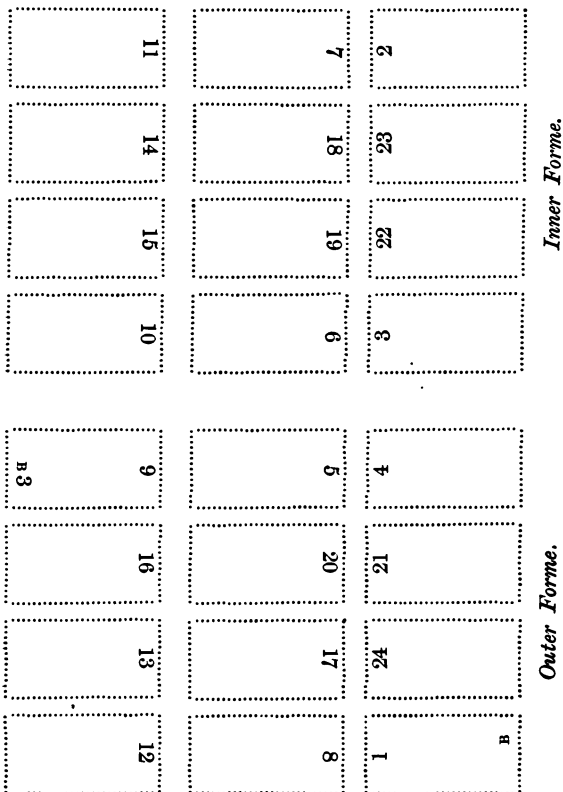
A SHEET OF TWELVES.



It will be understood that in this scheme the inner eight pages, or those which form the off-cut, must be cut off in folding and inserted in the sheet; for otherwise the heads of those pages would range with the feet of the others, or be upside down. But it is possible to impose a sheet of 12mo so that this off-cut need not be cut off. If the

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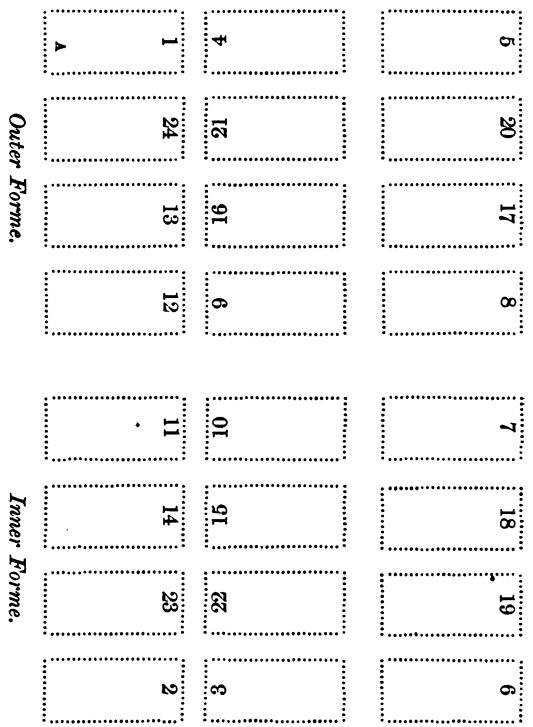
heads of the pages composing it are placed towards the rim of the chase, and in folding, the off-cut on the adjoining division is first folded, the heads of those pages will be all one way. The sheet may then be folded into the required size, keeping the first page fixed to the left.*

A SHEET OF TWELVES, WITHOUT CUTTING.



* The difference of arrangement is caused solely by the method of folding the sheet—twice the short way of the paper, then in the direction of the long cross.

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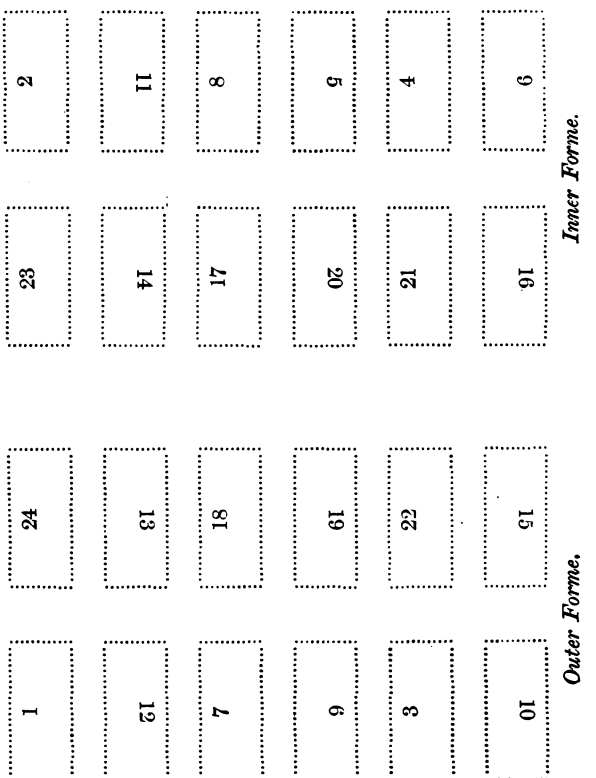
A Sheet of Long Twelves.—Long Twelves is a 12mo the pages of which read across the broad way, as in short music works; that is to say, the longest diameter of the page would be a horizontal line.

A SHEET OF LONG TWELVES, WITHOUT CUTTING.



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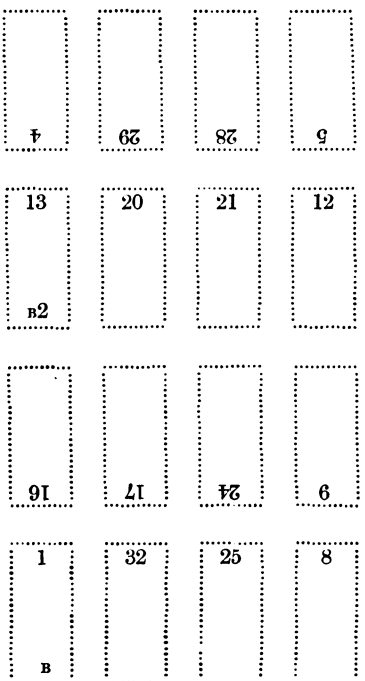
A Sheet of Sixteens is eight sheets of folio so imposed that when the printed sheet is folded, the pages shall follow in regular order. If the reader has understood the explanations of the previous schemes, he will not require any further explanation as to this. Nor will we give any of the impositions for larger formes than sixteens. They are seldom wanted; indeed, are more curious than useful; and as the *principle* is the same throughout, we need not occupy space in recapitulating it.

A SHEET OF SIXTEENS.



Outer Forme.

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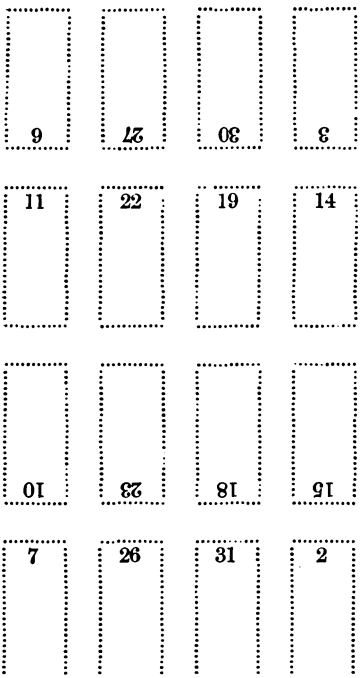
A SHEET OF SIXTEENS.



Inner Forme.

Half-sheet Work.—In order to economise press work, or for other reasons, pages are imposed so that the whole of them belonging to one forme are in one chase. The sheet is printed first on one side and then on the other, being turned in the latter case, so that what would be the outer forme backs would, in another kind of imposition, be the inner forme. The sheet is cut up, and two perfect copies of the work obtained. We give specimens

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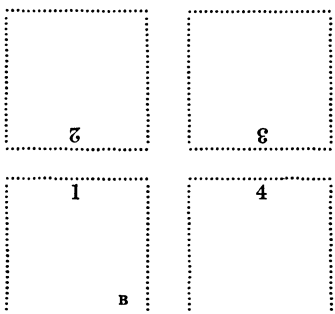
of three impositions of this kind: half-sheet of quarto, half-sheet of octavo, and half-sheet of sixteens.

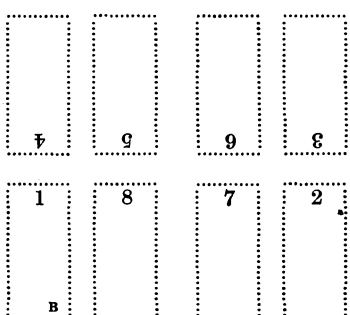
The *Half-sheet of Quarto* is simply a sheet of folio imposed in one chase. Two copies are impressed on the one sheet of paper, which is afterwards cut in two and the parts separated.

A HALF-SHEET OF QUARTO.



The *Half-sheet of Octavo* is a sheet of quarto imposed in one chase instead of two, and each section forms an independent sheet of 4to, or, as it is commonly called, a half-sheet of 8vo.

HALF-SHEET OF OCTAVO.



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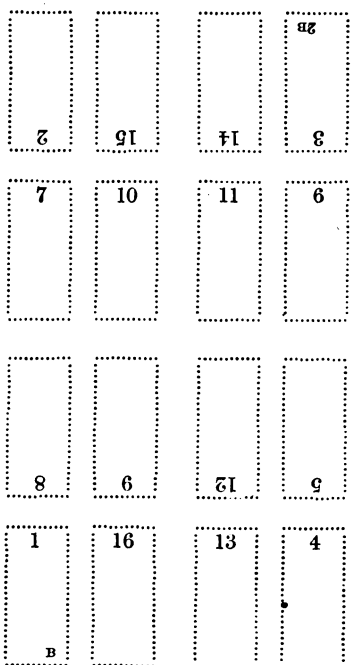
The half-sheet of twelves may be adapted for eight pages of a work and four of other matter, by imposing the eight as a half-sheet of octavo, and the four as an off-cut.

To impose sixteen pages of a work and eight of other matter as a sheet of twelves, impose the first as a sheet of octavo, and the second in the place of the off-cut.

The *Half-sheet of Sixteens* is a sheet of octavo imposed in one chase instead of two, the outer forme in one division, and the inner in the opposite half, as will be seen from the scheme. In other words, the signature pages are placed in opposite corners of the chase.

A HALF-SHEET OF SIXTEENS.



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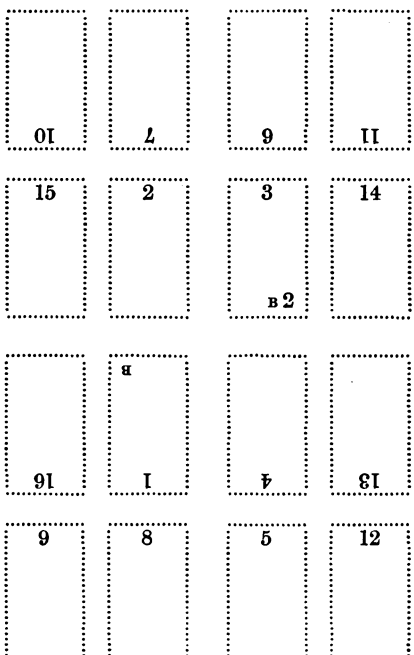
The *Half-sheet of Twenty-fours* is a sheet of twelves, imposed in one chase.

The *Half-sheet of Thirty-twos* is a sheet of sixteens imposed in one chase.

When a light page, or one which presents some difficulty in rolling, falls in the outside corner of the chase, it is sometimes found advantageous to *turn the pages in each section of the chase half round.* A half-sheet of sixteens might be thus treated :—



A comparison of the above scheme with that given as a half-sheet of sixteens will explain the process.

The inconvenience arising from the creasing of paper when folded several times may be obviated by contrivance

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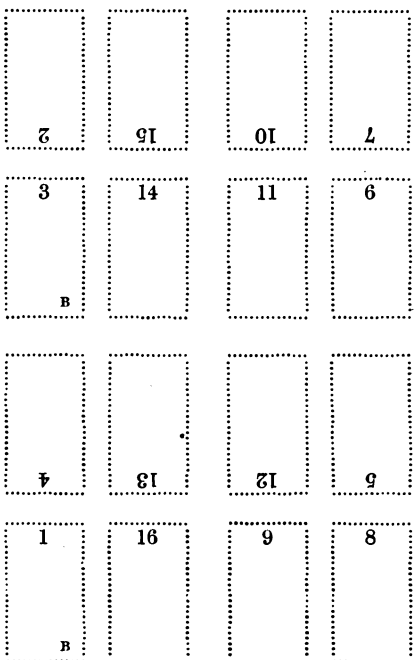
in imposition. A half-sheet of sixteens imposed according to the following scheme is equal to two half-sheets of octavo, one quired within the other, thus:—



It is obvious that books, like those in some Oriental languages, which read from right to left, and consequently begin on what we would term the last page, are imposed differently to the plans given above. The compositor will have merely to reverse them, hence it is not necessary to occupy space with the schemes in detail.

Leaflets.—The printing of leaflets, or formes of six, eight, ten, or twelve pages to fold to the size of a single page, without stitching, so as to read continuously, has of late years become very common. We therefore subjoin a

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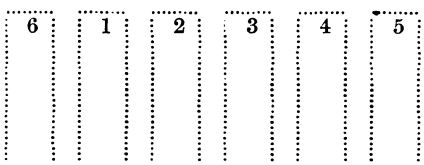
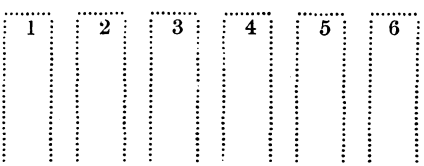
few schemes, showing the different positions of the first page in the forme, which is guided entirely by the taste or choice of the customer. Taking the position of the first page as a guide, the pages are imposed either in a row, heads on a line, or head to head, running from the first page to the right on the lower row of pages, and then from right to left on the upper row, until the forme is filled, the manner of imposition depending on the length of the forme or the way in which the paper to be printed will cut to the best advantage.

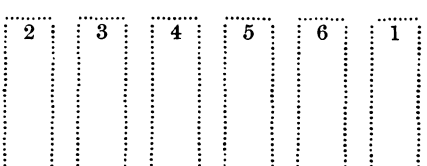
SIX-PAGE LEAFLET—*First page in Centre.*



SIX-PAGE LEAFLET—*First page to the Left.*



SIX-PAGE LEAFLET—*First page to the Right.*



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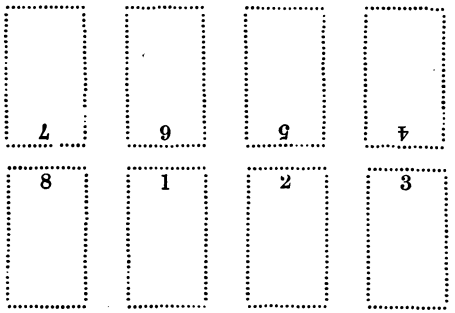
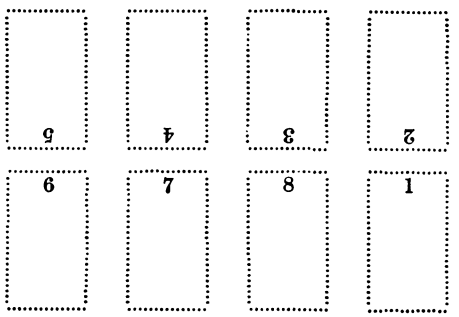
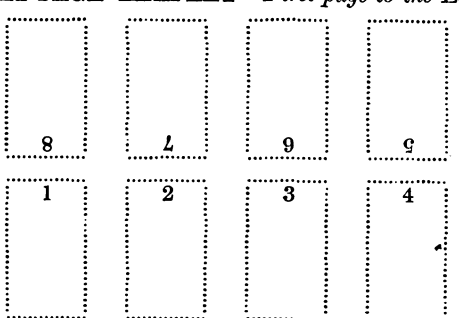
EIGHT-PAGE LEAFLET—*First page next to the Left.*



EIGHT-PAGE LEAFLET—*First page to the Right.*



EIGHT-PAGE LEAFLET—*First page to the Left.*



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CHAPTER XV.

LOCKING-UP—Preliminary Operations—The Parts of Pages—Use of the Off-cut Chase—Signatures, their Use and System—Numerical and Alphabetical Signatures—Dressing the Chase—Use of Foot-stick and Side-stick—Quoins—Untying the Pages—Planing Down—Locking-up—Lifting the Forme—Defects of Locking-up and their Remedies.

THE two preceding chapters will, we hope, enable any ordinarily intelligent compositor to perform two of the most important branches of his duties—the making of the margin and the imposition of the pages.

Having now got the pages into proper order on the imposing surface, and the proper margin or blank space between them ascertained, it only remains so to tighten the forme of movable type—that is to say, to *lock it up*—that every page may preserve its relative position, and the whole be made firm enough to enable it to be "lifted" from the imposing surface and "laid down," or "dropped," upon that part of the press which is designed to receive it.

When a forme is properly locked up, it is equally tight throughout in every part, and if the composition has been accurately done, no letter, space, or quadrat will, when the forme is raised, drop out. The forme is then said to "lift;" if it be loose in any part, it is said that it "won't lift."

It is necessary to explain a little more of the terminology of this part of the printing business. In speaking of pages there are seven expressions used to describe different parts or dimensions. They are—the width of the page, the length of the page, the back, the head, the gutter, the tail, and the off-cut.

Width of the page explains itself, and consists of the measure to which the page has been set, if not broken up into columns, or it is the measure which collectively is

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made by the type, the column rules, the border* rules, and the white spaces between them.

Length of the Page does not require explanation. It is used by printers in the same sense as "height" is used by bibliographers and booksellers.

The *back* is the space down which the long cross or bar of the chase passes, in a 12mo forme, and down which the short cross passes in an 8vo forme. It constitutes the fore-edge of the printed 12mo or 8vo sheet.

The *head* is the space forming the margin at the top of the page when printed.

The *gutter* is the space separating two adjoining pages, as between 1 and 12 in the first of the following diagrams, and 1 and 8 in the second.

The *tail* is the bottom space below the page.

The terms back, head, gutter, and tail are also used for both the space to be left on the printed page and the furniture of the forme.

The *off-cut* is a part of a sheet which is cut off before folding. This is only found in certain styles of imposition, such as the duodecimo (12mo). If the reader will mark a sheet as described for imposition of a 12mo with an off-cut, he will, on folding it, find that the pages cannot be got to follow in their proper numerical order unless the off-cut —that is, pages 5, 6, 7, 8—are cut off and folded in "quire wise"—that is, within the other portion of the sheet, consisting of pages 1, 2, 3, 4, 9, 10, 11, and 12.

In a sheet of 12mo the short bar does not cross the middle of the chase, as it does in an 8vo sheet. It is placed in the upper notches of the chase with the grooves for the points upwards, and is crossed in the middle by the long bar, which should always be put in last. The

* When a page is entirely surrounded by a rule or some fancy device it is said to be "bordered."

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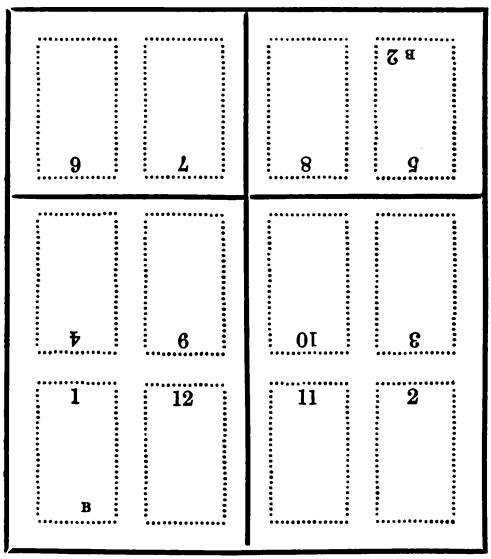
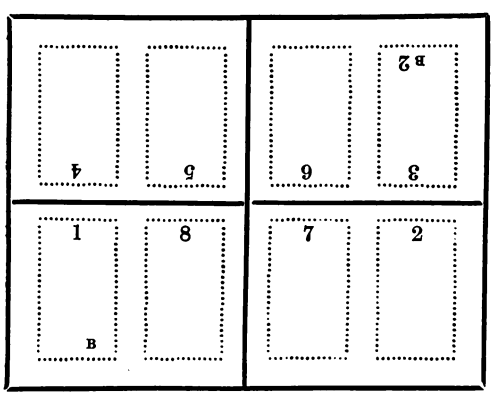
following diagrams will exhibit this distinctly, the heavy black lines being supposed to represent the chase:—



A DUODECIMO FORME.



AN OCTAVO FORME.

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We may here explain another term which will be used in this part of our work. It is that very important word, the *signature*.

If you open a printed book, you will find that at the foot of certain pages there is a letter, and at the foot of others a letter and a figure, as B, B 2. Open a few more pages and you will find another letter, and if you go through the book it will be seen that—

1st. These letters are in regular alphabetical order.

2nd. They occur at regular intervals of eight, twelve, sixteen, &c., pages.

The use of these letters is—

a. To designate the sheets of which the book is composed, so that we may refer to a sheet and call it signature N, for example, and know and indicate exactly the pages of which it consists.

b. To assist the binder in *folding*. This it does, because the signature occupies a certain specified place in every sheet, and it is only necessary that the folding is done so that the signature is in a certain position, to know that it is done properly without going through all the folios.

c. To assist the binder in *gathering*, that is, in collecting together the sheets so that they fall in proper order, as well as in *collating*, that is, examining whether the gathering has been properly done. If the letters fall in their due alphabetical order, the sheets must be right; it is not necessary to ascertain the sequence of the pages.

Two points in regard to signatures must be noted—

1st. There is no signature A: that belongs to the title-page, and would be unsightly if placed there. Besides, it is not necessary; for the title-page itself indicates how the sheet must be folded.

2nd. There is no signature J, V, or W. This has arisen from the fact that when signatures were first used, I and J were employed indiscriminately, as was also the case with U and V, while W was written UU or VV.

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In some offices, however, J only is omitted, making the alphabet to consist of twenty-five letters, which is a convenient number, being a quarter of a hundred.

If, however, the book contains more sheets than the alphabet will suffice to indicate, a second alphabet is resorted to, which is distinguished by a figure 2 being prefixed thus, 2 A, 2 B, 2 C, 2 D, and so on. If a third be required, the figure 3 precedes the letters, as 3 A. Where the book is not a bulky one, the alphabet is often duplicated for the second series of signatures, thus, A A, B B, or, A a, B b.

Signatures are usually in small caps of the same body as the page; they should be at the foot of the page, and near the right-hand corner, and are sometimes divided from it by a blank or white line.

If the book is in two volumes, each of them should have a separate independent sequence of signatures. But near the left-hand corner of the line the volume should be named; as, Vol. II.

These signatures are used for the *first* page only of each sheet. There are others inserted at the bottom of other pages, but the same letter is used throughout the sheet, however many signatures there may be. In the latter case, a figure is placed *after* the letter, as B 2, B 3, B 4, &c.

Thus 2 B means the B of the second alphabet, B 2 a second use of the letter B in the first alphabet.

It is necessary to have different numbers of signatures for different impositions, in order that the folding may be correct.

The rules on this point are:—

Octavos have two signatures, thus: B on the first page, and B 2 on the third.

Twelves have five signatures, thus: B (first page), B 2 (third page), B 3 (fifth page), B 4 (seventh page), B 5 (ninth page). Some of these, however, are occasionally

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omitted, only those on the first, third, and ninth pages being printed.

Eighteens are generally worked as three half-sheets of twelves, distinct from and independent of each other. Each of these sections has its own signature. Thus, to a sheet of this kind, B, C, and D are used for the first thirty-six pages, and E, F, G for the second, and so on.

When the signature is printed to a leaf, the sheet or page is said to be *signed;* when not printed, it is *unsigned.*

The preceding system of signatures has been adopted since the invention of printing, varying, of course, with the kind of sheets imposed. Thus, when the sheets were cut up before being worked, there was a difference in the arrangement necessary. The duodecimo, also, is a comparatively modern size, and was not known to the first printers. The writers, who preceded the printers, used signatures for convenience of collation.

Recently, however, in America and other countries, *numerical* signatures have been employed, as it is thought that they are more explicit than alphabetical ones. The sheets are numbered throughout the volume, as 1, 2, 3, and so on, the figures being placed invariably at the foot of the *first* page. Sometimes the signature for page 3, &c., is omitted. The off-cut is distinguished by an asterisk (*) being added to the figure. Thus:—

4to, 8vo, 16mo, 24mo, have signature 1 on first page.

12mo, { 1 on first page
1 * on fifth page

18mo, { 1 on first page
1 * on fifth page
1 * * on seventh page

48mo, { 1 on first page
2 on seventeenth page
3 on thirty-third page.

More recently still, a system has been adopted of printing the signature so low down on the leaf that it will be *cut off* when the book is trimmed, or cut on the edge by the binder. This plan was adopted by the scribes, and has.

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led to the common error that their leaves were unsigned. It is done to improve the appearance of the page, but cannot be recommended, for the book may require to be re-bound, when there will be no indication of the beginning of the section available for the purposes of the bookbinder, nor any assistance in the collation of the sheets in their proper order.

ALPHABETICAL SIGNATURES.—*Sheets.*

No. of sheet.	Signature.	Folio.	Quarto.	8vo.	12mo.	16mo.
	A	0	0	0	0	0
1	B	1	1	1	1	1
2	C	5	9	17	25	33
3	D	9	17	33	49	65
4	E	13	25	49	73	97
5	F	17	33	65	97	129
6	G	21	41	81	121	161
7	H	25	49	97	145	193
8	I	29	57	113	169	225
9	K	33	65	129	193	257
10	L	37	73	145	217	289
11	M	41	81	161	241	321
12	N	45	89	177	265	353
13	O	49	97	193	289	385
14	P	53	105	209	313	417
15	Q	57	113	225	337	449
16	R	61	121	241	361	481
17	S	65	129	257	385	513
18	T	69	137	273	409	545
19	U	73	145	289	433	577
20	X	77	153	305	457	609
21	Y	81	161	321	481	641
22	Z	85	169	337	505	673
23	2 A	89	177	353	529	705
24	2 B	93	185	369	553	737
25	2 C	97	193	385	577	769
26	2 D	101	201	401	601	801
27	2 E	105	209	417	625	833
28	2 F	109	217	433	649	865
29	2 G	113	225	449	673	897
30	2 H	117	233	465	697	929
31	2 I	121	241	481	721	961
32	2 K	125	249	497	745	993

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On the preceding page is a table of signatures for the most useful impositions, extending as far as any ordinary volume. If more signatures are required they can easily be calculated.

We give, later on, however, a table of signatures on the numerical plan.

It will be noticed that in the first signature A is not folioed in *Arabic* numerals. It generally consists of title, introduction of preface, contents, &c., and is folioed in *Roman* numerals, as i, ii, iii, iv, v, &c.

When the introductory matter extends over more than one sheet, its signatures are usually printed in lower case italic letters.

As works are frequently imposed in *half-sheets*, we give the following table of signatures for half-sheets for convenience sake; although the whole-sheet table might be used for the same purpose; for a work in octavo the signatures of quarto might be used, and so on:—

ALPHABETICAL SIGNATURES.—*Half-Sheets.*

No. of sheet.	Sig.	8vo.	12mo.	16mo.	No. of sheet.	Sig.	8vo.	12mo.	16mo.
	A	0	0	0					
1	B	1	1	1	17	S	129	193	257
2	C	9	13	17	18	T	137	205	273
3	D	17	25	33	19	U	145	217	289
4	E	25	37	49	20	X	153	229	305
5	F	33	49	65	21	Y	161	241	321
6	G	41	61	81	22	Z	169	253	337
7	H	49	73	97	23	2 A	177	265	353
8	I	57	85	113	24	2 B	185	277	379
9	K	65	97	129	25	2 C	193	289	385
10	L	73	109	145	26	2 D	201	301	401
11	M	81	121	161	27	2 E	209	313	417
12	N	89	133	177	28	2 F	217	325	433
13	O	97	145	193	29	2 G	225	337	449
14	P	105	157	209	30	2 H	233	349	465
15	Q	113	169	225	31	2 I	241	361	481
16	R	121	181	241	32	2 K	249	373	497

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The following table of numerical signatures, as used in America and elsewhere, is drawn up on the plan generally adopted there, and differs in arrangement from those given above :—

NUMERICAL SIGNATURES.—*Half-Sheets.*

8vo.		12mo and 18mo.		16mo.		24mo.	
Page	Sig.	Page	Sig.	Page	Sig.	Page	Sig.
1	1	1	1	1	1	1	1
9	2	5	1*	17	2	9	1*
17	3	13	2	33	3	25	2
25	4	17	2*	49	4	33	2*
33	5	25	3	65	5	49	3
41	6	29	3*	81	6	57	3*
49	7	37	4	97	7	73	4
57	8	41	4*	113	8	81	4*
65	9	49	5	129	9	97	5
73	10	53	5*	145	10	105	5*
81	11	61	6	161	11	121	6
89	12	65	6*	177	12	129	6*
97	13	73	7	193	13	145	7
105	14	77	7*	209	14	153	7*
113	15	85	8	225	15	169	8
121	16	89	8*	241	16	177	8*
129	17	97	9	257	17	193	9
137	18	101	9*	273	18	201	9*
145	19	109	10	289	19	217	10
153	20	113	10*	305	20	225	10
161	21	121	11	321	21	241	11
169	22	125	11*	337	22	249	11*
177	23	133	12	353	23	265	12
185	24	137	12*	369	24	273	12*
193	25	145	13	385	25	289	13
201	26	149	13*	401	26	297	13*
209	27	157	14	417	27	313	14
217	28	161	14*	433	28	321	14*
225	29			449	29		
233	30			465	30		
241	31			481	31		
249	32			497	32		
257	33			513	33		

Great care should be taken by the compositor to see that his pages bear their proper folios before being tied up. No excuse should be accepted for negligence in this matter.

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Having his pages laid properly on the surface, the compositor should, as a further precaution, examine the folios and signatures to see that they are correct and agree with the tables preceding. If there is any error in position, it may now be easily remedied; but after the forme is locked-up the cure will be more troublesome.

Now procure a pair of chases, of the size necessary for the forme; that is, sufficiently large to contain the pages and allow some space all round for the locking-up.

It is advisable to use the same pair of chases, or at any rate chases of exactly similar dimensions, throughout the work, to ensure what is called exact "register," as will be explained hereafter.

The sidesticks, footsticks, and furniture should now be obtained from their places in the office or from the store-room, either by the compositor or by the "quoin-drawer overseer."

The remaining operations of putting in the furniture, untying the pages, and locking-up the forme will now be described.

The pages having been properly laid down on the imposing surface, a suitable chase placed over them, with its bars falling in their proper position, and the furniture fitted so as to make proper margins, the next thing is to *Dress the Chase*, that is, to fit it with the furniture necessary for locking-up the forme.

The chase, if properly chosen, will be just large enough to allow room for footsticks, sidesticks, and quoins. The spaces at the crossbars must be regulated with furniture, reglet, or leads.

The nature of *Footsticks* and *Sidesticks* has been already explained. If the reader will refer to the diagram on page 66, he will understand the exact use of the appliances.

There he will see a forme of eight pages locked-up in chase, with furniture dividing the pages. He will perceive that at the side and at the foot of each set of four pages—that is, between the pages and the chase—are the side and footsticks; but instead of the ordinary wedge-

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shaped ones, whose use is now to be referred to, racked ones are there used. The principle is the same in both cases. The object is to tighten the forme by the insertion forcibly of a wedge or wheel which, pressing on the chase, pushes up and fastens the type on the other side. In using common footsticks and sidesticks, however, the broad part of the sidestick would be at the top left-hand corner of the left side section of the forme, and the broad part of the footstick at the lower right-hand corner. Both would taper in the same direction, and their thinnest ends approach each other at the lower left-hand corner.

To render it still more plain, let the reader turn to the diagram on page 67. Here the four chases are each supposed to hold only one forme. In the first chase the thick end of the sidestick would be underneath the letter M, and that of the footstick at the lower left-hand corner; the thin parts of both being towards the top left-hand corner.

If the eight-page forme were made up in a chase, with a *long cross*, or bar, as shown in the diagram on page 64, the arrangement would be similar to that for the four chases (page 67), and the forme would, in reality, be similar to that, except that the four chases would be in one piece—that is, in an ordinary bookwork chase. The rest of the quarters will, of course, be treated in the same manner.

Next, *remove the string from the pages*. This must be done carefully, and requires some practice, or the types will get out of their places at the sides, and the pages become, in printers' phrase, "squabbled."

We have already stated that the proper way to tie up a page is to begin at the left top corner; to wrap the cord round from left to right, tightening each successive round at the right top corner. It has then been passed round the page about three times, the first end being additionally secured each turn, and the end of the cord being drawn tight through the whole at one corner to form an end, which protrudes two or three inches. It is this end which must now be laid hold of, and if it is firmly, yet gently

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pulled, the cord will unwind itself. Take hold of it by the thumb and first finger of the left hand, and extricate each fold by the same fingers of the right hand. The whole cord will generally leave the page without disturbing a single type. Next, fasten up the forme a little with the quoins, by pressing upon them with the fingers, but do not make it too tight. Tie up each string into a little bundle, without knotting it, and put it by for use on another occasion.

In removing the page cords from a bookwork forme, begin with the pages next to the bars. Take hold of the protruding end of the cord with one hand, laying the other flat on the page to prevent the letters rising. Unwind the cord and close up the page by pressing the sidestick and footstick against it.

The pages will be considerably compressed when the mallet and shooting-stick are used; hence larger quoins than now appear requisite will be wanted.*

Practice and judgment alone enable the compositor to select the proper quoins, and frequently he has to do it by trying several before one will be found to fit. Put in, say, three quoins at the side and two at the foot, respectively. Of course these quoins must taper the reverse way of the side and footsticks; they must run smaller towards the thick end of the former, and larger towards the thin ends. Push up the quoins gently with the fingers, until the forme is somewhat tight; notice whether the quoins are approximately suitable; and loosen the whole a little.

The *planing* of the forme is the next consideration.

The planer is simply a flat piece of beech or other hard wood, about 10 or 12 inches long, 4½ inches broad, and 2 inches thick, with a perfectly smooth under surface. A groove usually runs along the two longer sides to enable the workman to handle it more rapidly.

* If there are no quoins to be had that are broad enough to fill up the space, two may be used together, or one quoin may be used and a little piece of reglet. But it is best to avoid having a larger space than can be filled up by a single quoin, and the smaller this space is, the more secure the forme. It should be wide enough, though, to admit the shooter easily. Leads should never be used to eke out quoins; to do so is an idle, wasteful practice, not permitted under any circumstances in a well-regulated office.

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Planing the forme is the process of making perfectly even the face of the forme, by driving down into its proper place every letter that may, accidentally, stand a little higher than the rest. Although a simple operation, it is seldom properly performed.

Wrap the planer in a piece of smooth paper, and, holding it with the left hand, tap it gently but firmly with the end of the handle of the mallet, which, in doing this, should be held with the head upwards. Care should be taken to strike the planer in the middle, so as to distribute its pressure over the forme.

In this way the forme becomes perfectly level on its face, and it only remains to lock it up. For this purpose the *mallet* and *shooting-stick* are brought into requisition.

The quoins, in the first or preliminary locking-up with the fingers, should not be so small that they can be driven up to the extreme end of the side or footsticks, but such that they may be pushed forward, when the greater pressure of the mallet is applied, a half or quarter inch, according to the size of the forme. Hold the shooting-stick in the left hand in almost a horizontal position, whereby the greatest amount of power is obtained with the least danger of damaging the shooting-stick. If the forme is in four quarters, as already described, each should be *partially* locked-up before any is completely locked up (except, of course, the last); otherwise the cross-bar will be sprung or bent. Drive up the quoin nearest the thick end of the side and footsticks first, and then operate on the others, finishing up at the thin ends. In this way the whole will be equally fastened; but if one part is tightly fastened and another loosely, the pages will bend, and become crooked, and a good lock-up—one in which the forme is nearly as solid as though consisting of one piece of metal—will be altogether unattainable.

Again plane down the forme lightly and carefully. This is done, not so much to drive down any outstanding letters (for they ought all to have been sent into their places by the planing before quoining up) as to neutralize any upward bend, or "arching," of the forme, and to which it

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is especially liable if there are many or large open blank spaces in it.

The next thing to be done is to "see if it will lift;" that is, if it can be raised up from the imposing surface without any letters falling out.

Draw the forme over to the side of the stone nearest to you, and let the chase overhang about an inch. By taking hold of the projecting part the forme may be raised. It should only be raised a little, say an inch, at first, and before you are sure that all is tightly secured. If suddenly lifted on end, one section that happens to be loose may fall entirely into pie. If letters fall out, that is, if the forme is loose in any part, the fault is due either to bad "justification" in the composition, or imperfect "locking-up." The remedy in either case will be obvious. The forme must be unlocked, lines or pages adjusted, or fresh quoins inserted.

Even if letters do not fall out, there may be loose parts, and these may be discovered by lifting up the forme from the stone about half an inch at one end, and slightly pressing the fingers over it in every part. Loose places must be secured by tighter locking-up.

It may be well before proceeding any further to recapitulate in their proper order the different processes which have thus far been described. They are:—

1. Setting up the matter letter by letter until a line is formed, and a number of lines sufficient to fill the stick.
2. Emptying the stickful on the galley, and successive stickfuls, until the whole sheet is composed, and laid on one or more galleys.
3. Making the matter up into pages.
4. Tying up the pages.
5. Sliding the pages on to the imposing stone.
6. Imposing the pages.
7. Making the margin.
8. Putting on the chase.

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9. Dressing with furniture.
10. Inserting the side and footsticks.
11. Fitting the quoins.
12. Unloosing and removing the page cords.
13. Tightening up the pages.
14. Preliminary locking-up.
15. Planing the forme.
16. Final locking-up.
17. Planing down the forme.
18. Ascertaining if the forme "lifts."

An impression, called a proof, is to be taken of the forme to ascertain how the composition has been executed, whether it is conformable to the "copy," and whether there are any defects of workmanship to be rectified before the forme can be worked off.

Proofs are said to be "pulled," not printed, the more dignified term being reserved for the perfect impressions. Proof pulling belongs to press work, which is a separate division of our subject, and, therefore, a description of the operation must be deferred for the present.

The compositor should collect his copy, write his name on the first page of it, tie it up in a small roll, and send it with the forme to be pulled.* He will not see the copy again, in the ordinary course of things. All the errors and imperfections will be marked on the proof by the "reader." The forme will then be returned to the compositor, and he must lay it down again on the imposing surface, carefully unlock it, and prepare for "*correcting*," to which we must next refer.

In the operations already described the following technical terms with which the young compositor will not be familiar, will probably have been used, and, therefore, require explanation:—

* In large offices one printer is employed entirely in pulling proofs; hence he is called the proof-puller. In small offices the compositors pull the proofs of their own matter.

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The Page Hangs.—When a forme is badly locked up some of the pages will be found to be bent by the unequal pressure upon some parts of them. They would consequently print crooked. The remedy is to unlock the quarter in which they are imposed, and to pat the face of the type with the fingers of one hand, at the same time pushing up and straightening the page with the other.

In unlocking a form the quoins should not be left too slack, or the operation of loosening the others may either squabble the matter or cause it to hang.

Pages too Long and *Pages too Short.*—Before the quoins are driven up the compositor should carefully ascertain whether the pages of each quarter are of the same length. The slightest difference will cause them to hang, and prevent a proper locking-up, endangering, in fact, the whole forme when it is lifted.

To test the accuracy of the pages in regard to length, place the ball of each thumb against the centre of the footstick, raise it a little with the pressure, and if the ends of both pages rise equally with the stick it is an indication that they will not bind, and that the forme will properly lock-up.

Furniture Binds.—If the furniture used is too long, that is, if it is as long or longer than the measure of the page, the side or footstick will not have its proper pressure upon the type: in fact, the pressure will be exerted on the furniture and not on the page. In such a case the furniture is said to "bind." The remedy is to employ smaller furniture.

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CHAPTER XVI.

CORRECTING—Explanation of the Reader's Marks—Correcting in Metal—The Space Box—Use of the Bodkin—Overrunning—The Revise—Subsequent Proofs—Author's Proofs—Press Proof—Press Revise—Customs of the Trade as to Correcting—Technical Terms Used—Keeping Accounts of the Stages of Correction.

WE will suppose that the forme has been "pulled" by the pressman, and the proof "read" * by the reader, and the forme and the proof are in the hands of the compositor.

The proof, before it is read, is called the "first proof." A proof that contains many errors is said to be a "foul" or "dirty" proof; if there are no errors it is said to be clean.

All the corrections made by the reader are called "marks," or reader's marks. A complete code of signs has been gradually formed for indicating the different errors which may occur in a proof. It is of the first importance that the compositor should clearly understand their meaning.

Errors are indicated by marks with a pen in the body of the page where they occur, and signs are placed in the margin to direct the eye of the compositor to the fault, and where necessary to show how they are to be rectified. †

It is essential that these marks should be fixed, and always have the same meaning. For instance, the sign for a turned letter and that for a letter wrongly inserted is always the same, and is marked alike in every office.

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* The rectification of the errors and imperfections of composition is called "correcting," and the process of examining and perusing the proof, and making these errors upon it, is called "reading." Hence, "reading" and "correcting," although both applicable to the proof, have specific meanings, and for the sake of distinction it is said that type matter is corrected, and the proof is "read."

† It is always to be understood that the compositor will not attend to any mark in the text, unless his attention be drawn to it by some sign in the margin.

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AN EDITOR'S HOLIDAY.

Passing on we see the ruins of the Temple of Peace, and such ruins! Several noble arches form three aisles of 300 feet by 200 feet, and the arches show decorated masonry which may make us well believe that there were excellent masons, bond or free, in those days. We now come at once upon the most perfect, the most public, and the most interesting of ancient sights, the Arch of Titus. The Rector of Warrington photographed it ten years since, and kindly gave me a copy, which has familiarised it to my mind. There it stands about fresh as 1,800 years ago. One of the Popes has mended it a little. It is a memorial of the destruction of Jerusalem. On the front is an inscription to that effect; and on the inside of the arch are ~~inside of the arch are~~ engravings of the sacred vessels carried away by the Romans. It would not be there if St. John visited Rome in his old age he would see the melancholy sight. No doubt Josephus often passed under this arch, as he lived at Rome until the days of Domitian. Through it passed the Via Sacra on to near the Colosseum, where it rounded the Palatine, and was called the Triumphal Way.

The Colosseum. We are in it at after last years of hopes, fears, and longings. And this is the building finished ten years after Jerusalem was destroyed; and at which so many Jewish slaves toiled. Its proportions are too perfect to look large. It forms an ellipse; built four storeys high, three of the storys resting on 240 arches. Half-columns of the Doric order support the first range, Ionic the second, and Corinthian the third, and the fourth story, of which one half remains, had a solid external face of Corinthian pilasters. The centre of the arena had full underground accommodation for wild beasts, gladiators, and their belongings. On arches rising ~~on arches~~ are tiers of seats for 87,000 spectators. The uppermost have had an awning over them, supported by poles in rings outside, yet visible; but of course the Colosseum is an unroofed building, covering nearly six acres, or double that of Carnarvon Castle, and

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The accompanying illustration is a specimen of a proof after it has been read, and it is composed in such a manner as to show all the errors and marks of correction that might occur in an ordinary volume.

We have already said that the compositor is bound to write his name on his copy, with a mark showing where he began to set. In this specimen the name of the first compositor is duly written down; it is transcribed from the "copy" by the reader. A little lower down occurs another name, and a mark indicating where another compositor took up the work. Each of these portions is therefore appropriately called a "take."

It will be seen that all the letters, words, and points that are to be inserted, on account either of omissions or of inaccuracies, have a separating line, thus /, after them. The mark is useful in separating the correction from any other that may follow.

In regard to points, however, there are some exceptions. The hyphen and the em dash have two stroke lines, one before and one after them. The apostrophe has a small curved line prefixed to the diagonal line. This is to indicate that it is a superior, that is, stands above the line; otherwise the mark might be mistaken for a comma. All *superiors*, such as figures, letters, &c., are so marked. The period, and sometimes the colon and semi-colon, are *encircled*, instead of being merely set in front of the stroke.

The most arbitrary of the marks are the signs for *spaces*, which consist, as will be seen, of two parallel strokes crossing two others; and that for *pushing down spaces*, which consist of one perpendicular and one horizontal line something like this ($\underline{|}$).

Quadrats, having no faces to be represented, also have an arbitrary mark, that is, a small square, as will be seen opposite the twenty-second line. If it is desirable to mark a two, three, or four em quadrat, a rectangle is drawn with lines dividing it into as many squares as em quadrats are wanted.

Italics, small capitals, and capitals are respectively marked in manuscripts by one, two, and three lines being

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drawn under them. In printers' proofs it is advisable to make strokes under the alteration, and in the margin to write "ital," "sm. caps," or "caps," as the case may require.

When it is intended that a type should be altogether taken away, the pen is run through it, and a character something like the letter S written in the margin. The latter is a contraction of the Latin word *dele*, erase.

A letter that is turned wrong side up is also either struck through with the pen, or a mark made underneath it, and in the margin is placed a circular sign, like that prefixed to the fourth line.

The next mark, called a crotchet, is to show that a new paragraph ought to begin there. In the margin "new par." or "n.p." must be written.

A bad letter is marked like the letter *m* in the seventh line and a cross (+) made over against it in the margin.

Anything omitted is marked in the margin as a wrong letter would be; and at the place of the omission a caret (ʌ) is placed. To mark the hiatus more distinctly, it is found to be convenient to make the first limb of the caret much longer than the other, as will be seen in the specimen. Foreign printers generally put a caret after the correction in the margin, but it is not necessary, and is seldom done in this country.

The mark for indicating where a paragraph is to be "run on" explains itself.

Where the spacing is not arranged to the satisfaction of the reader, he places between the words a sign like that of the angle in geometry (⩗) to show that the space is too great, and a short stroke (/) to show that it is too small, calling the attention of the compositor to the necessary rectification by using the space mark in the margin.

Letters or words in wrong order, and requiring to be transposed, are struck through with the pen, and *trs.* (transpose) written in the margin. Those that are of a wrong fount are likewise struck through, and *w.ft.* is written in margin.

When a reader is in doubt about any word or letter, he marks it and writes *qy.* (query) in the margin. The compositor does not attend to this, as it is only done to remind

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the reader that the mark is to be transferred to the clean proof, which will afterwards be pulled and sent to the author.

If anything has been marked in mistake—deleted, for instance—a few dots are placed under the correction, and the word *stet* (let it stand) written in the margin.

Sloping lines will be noticed drawn across several of the lines at the bottom left-hand corner of the page, and smaller and similar marks opposite them in the margin. These indicate that the lines are crooked, and require to be straightened.

Higher up, at the right-hand side, there are lines enclosing certain small words, and smaller ones corresponding to them in the margin. These are to indicate that the words are to go into another line, in order to regulate the spacing. This kind of correction is called "railroading," or overrunning, but it gives the compositor much trouble, and is only resorted to when absolutely necessary. It is advisable to put in a caret at the beginning of the line to which any of the words are to be removed.

If any considerable number of lines are omitted, a caret is marked at the point where the omission occurs, and "out—see copy" written in the margin. A considerate reader, however, will seldom so mark a proof, but will himself write the words to be supplied. Reference to the copy—which is now in the custody of the reader—involves a loss of time to which the compositor should only be subject when his omission is of large proportions.

When the compositor is working "on the piece," he makes all the corrections in the first proof and its revise at his own expense, and can be required to attend to those marks only which indicate where he has departed from the copy, or where his workmanship is imperfect. Any alteration over and above these, that is desired by the reader, is called a "house mark," because it is separately paid for by the "house," or the employer. Corrections of this kind are distinguished from others by being *entirely circled*, which indicates that the correction will be paid for.

If the compositor will carefully read the preceding, he should have no difficulty in understanding the reader's

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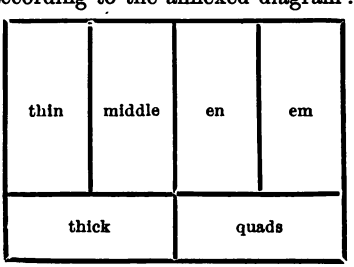
marks—cabalistic to the uninitiated—which he will find upon his proof. He has now to begin "correcting in the metal."

If, as will seldom happen, the pressman has not "washed over" the forme, it must be done now. We will, however, in pursuance of our plan, leave over for another occasion a description of this operation.

Take the forme to the imposing surface and "drop it;" that is to say, lay it gently in its place in such a position that the head of the forme, if it is a job, or the bottom of the first page of the forme, if it is bookwork, is nearest you. The proper way to drop a forme is to place it standing one edge on the surface, and then gradually to bring the other down, permitting the edge held to the hand to project a little over the imposing surface in order that it may be brought down without having to withdraw the fingers, and without letting the whole come down with a thud. Carelessness in dropping a forme frequently injures it or the imposing surface.

Next, unlock the forme all round; that is, if the forme is in quarters or sections, let each be unlocked, for if only one section is unlocked there will be a dangerous uneven strain on the bars of the chase. Do not, however, allow the quoins to be too loose, or the matter may become squabbled.

Take the proof to the case and set up in proper order in a composing-stick all the types that will be required to make the corrections. Take out a few of each kind of spaces from the case and lay them on a piece of paper, without mixing them; or, what is better, get a correcting tray, made according to the annexed diagram:—



SPACE BOX.

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It should be about 6 in. by 4 in., and ¾ in. deep. It can be supplied with a few of the spaces of the particular fount in use each time there is correcting to be done. When finished, however, all the spaces must be returned to their proper places in the case.

With the corrections set up in the stick, and a few spaces at hand, the compositor is ready to begin correcting. He will want a sharp bodkin to raise the letters required to be taken out.

The bodkin is a small sharp-pointed instrument consisting of a tapering steel blade, fixed in a short round wooden handle. The blade should be made of good steel, capable of keeping a good sharp point at the end. Compositors are expected to provide their own bodkins; indeed, a bodkin and a setting rule constitute often the compositor's sole personal business effects. Blades for bodkins are sold by printers' brokers, at 3s. per dozen; it is, therefore, not creditable to a man if he has not a proper one always at hand.

Take the bodkin in the right hand and place the point of it against the *shank* of the letter that stands at the end of the line which contains the correction. Be careful to avoid touching the face or seriffs of the type with the bodkin, otherwise the type will be irremediably injured. Place the middle or second finger of the left hand at the beginning of the line. The line may now be raised above the level of the rest of the type, and the compositor will have not only a clear view of every letter in it, but ready access to any that may require alteration.

Take out with the thumb and first finger of the left hand the letters that have to be removed, and insert the fresh letters with the same fingers of the right hand. When the line is thus corrected, push it down to the level of the other lines, and pat it on the top with the fingers, in order to get all quite level, taking care to push all the spaces down.

If the correction is very large, or involves an alteration in spacing, the proper plan is to lift out the line, to put it in a composing stick, correct it, rejustify it, and replace it in the forme.

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It is most important that when letters really do require to be drawn out with the bodkin (which is less often than inexpert compositors seem to think), the point of the bodkin should not be applied to the face or kern. The bodkin must be held as upright as possible, in order to avoid injuring the types that are contiguous.

When all the corrections are made, the whole of the types set in the composing stick for alterations will be used up. If they are not, either too many have been set up or all the corrections have not been made. The plan of setting up the corrections beforehand generally acts as a test of whether the marks have all been attended to, and obviates the necessity of going over them to check them.

Some compositors save much time by correcting in the following manner:—While the hands are employed in making the first correction, they look out for the place where the second is to be made, and when that is done they look out for the next, and so on till all are finished. Indeed, the fingers should never be kept idle in correcting.

Others adopt the plan of doing all the literals * first, then the transpositions, then the "doubles," † and then the "outs." ‡ It may in some cases be economical of time to do all the literals first, but as many of them involve alterations in spacing, we think the error and what it leads to, *i.e.*, re-adjustment of the spacing, should be done at the same time and before proceeding to anything else. The subsequent classification of the errors into doubles, &c., we cannot but think unnecessarily taxing to the mind, and as retarding rather than facilitating the speed of the work.

If there are more letters to be inserted than to be taken out, the spacing must be diminished; but on no account should the symmetry of the matter be injured by too small spaces being used.

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* A "literal," that is, a literal error, is an error consisting of a type being wrongly inserted; the name distinguishing it from other errors of workmanship.

† Doubles are errors of duplication, a letter, for instance, being wrongly inserted twice.

‡ An "out" is an accidental omission of one or more types.

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If the line is too long after all allowable space is taken out from between the words, there is nothing for it but to "overrun" the matter; that is, to take some of it into the succeeding line, and some of that into the next one, gradually diminishing the matter taken over until all has been got in, without injuring the appearance of the work. A very simple insertion may cause a whole page to be overrun, if the type is large.

The best way to overrun is to lift the line bodily out of the forme, and place it on the sides of a galley. Then make the insertion, and notice how much the line is too long. Endeavour to make an estimate of how many lines will require to be overrun, and place them, if possible, along with the first, making one long line. Then take as much matter up on the setting rule, and place it in the stick, as is required to fill the measure. Justify it in the stick, then take up enough matter for another line, justify that, and so on. When all the matter requiring overrunning has been justified, it can be lifted from the stick into the forme, and will be similar in appearance and measure to the rest of the page.

When all the corrections have been duly made, the forme must be locked-up again and sent, along with the foul proof, to the pressman, in order that a *revise* may be pulled.

The revise is a proof pulled to ascertain whether the corrections marked in the previous proof have all been duly attended to. A revise is sent to the reader with the first proof, and the reader marks upon it the errors which have not been corrected, or any imperfections which may subsequently have occurred. The revise is then sent to the compositor, who "does the corrections" in the type. A "clean proof" is next pulled, and sent to the author or customer.

If, however, the marks on the revise are very numerous, the reader frequently writes "Pull another revise," which he examines before the clean proof is pulled. As the necessity for the second revise arises from the carelessness of the compositor in correcting the errors of the first, he

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can hardly complain of additional trouble being imposed upon him; indeed, the lesson will be a salutary one, if it conduce to greater caution in future.

Other proofs may be required before the forme is ready to be sent to press; these have distinct names.

The "author's proof" is usually pulled on paper of a better quality than that which suffices for the office proofs, and at the top left-hand corner is usually affixed a label containing the names of the printers and the date on which the proof is sent out, as well as the nature of the proof, whether 1st proof, 2nd proof, and so on. The proof and the copy for it (except that part of it which contains the prima of the next sheet, which is retained) are now despatched to the author through the proper channel.

The proof, when returned with the author's marks, will be given to the compositors for the matter to be corrected, and a rough proof will be pulled and sent with the author's proof to the reader, who will revise it, marking at top "R. A. P." (revise of author's proof). If any of the corrections have not been done, he will require another revise, otherwise he will write on it how many clean proofs are to be pulled, and send the revise to the compositors. When he gets the clean proofs he compares them with the last revise, and if satisfied sends out the second A. P. with the first A. P. to the author, marking "2nd proof" on the label.

We will suppose that this second author's proof has been returned with an intimation that the author is satisfied and that the sheet may go to press. This proof will be made the "Press Proof," and will be preserved in the office as evidence that the author's directions have been carried out. It will now go, preferably, to another reader, called the Press Reader, who will read it through from beginning to end, to detect any errors or defects of workmanship, &c., that may have crept in.

If these mistakes or imperfections are numerous, the reader will order a Press Revise to be pulled, and satisfy

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himself that his marks have been attended to. If they are not numerous, he will write on the top "For Press," the number of copies, his initials, and the words "Query Furniture," in order to call the attention of the clicker to the maintenance of the proper margin, which by some chance may have been overlooked.

As a final precaution, in most large offices there is a "Machine Reviser," who, last of all, after one copy has been worked at the machine, compares it with the author's press proof to see that every imperfection has been rectified. He marks this proof as a machine revise, and it is put away on a file.

If the type is not to be worked from, but the forme has to be stereotyped, instead of one revise being pulled to be marked "for press," two are pulled; one is marked "foundry," and kept in the establishment, the other being given to the stereotyper.

Occasionally proofs are required at different stages of the work. It should, therefore, be understood that there are three kinds of proofs—

1. Proofs in slips, or slip-proofs.
2. Proofs in pages.
3. Proofs in sheets.

Proofs in slips are pulled when the matter is on a galley, as is generally done in the case of newspapers or periodicals. The length of each slip is immaterial. The matter may be tied up and slipped off the galley, or it may be locked up in a chase. It should be so arranged, for convenience sake, that the length of the matter is not that of a page. When several proofs are required, it is always better to lock up the matter, for matter in a galley, protected by a string only, is apt to get off its feet and to cause "pie," when repeatedly pulled.

When proofs are pulled in pages, the pages are tied up, and either pulled separately or they are locked up like

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broadsides. Such proofs differ from proofs in sheets in not being imposed in proper order for folding. They are usually taken because a proof is wanted of matter which would not make a complete sheet, or on very large paper with wide margins, where an unusual number of corrections are expected.

Proofs in sheets are pulled just as the matter will appear when sent to press. The imposition and margin must alike be duly attended to.

In London, and in large towns where London customs are followed, there are certain regulations in force concerning corrections. When a compositor is "on 'stab" (on the establishment), that is, when he receives weekly wages, or works "on time," the correcting is done as part of his time work. But when the compositor is "on piece," that is, when he is paid for his work one specified prearranged price, he corrects his errors at his own expense. Hence, if a man is on 'stab, it does not matter whether he is called upon to correct another's mistakes as well as his own; but if he is on piece, he is amenable to the correction of his own matter only. These remarks apply to the first proof and its revise.

Time is occupied not only in correcting, but in operations preliminary to it, such as finding the forme, dropping it, and unlocking it. Hence it has been arranged that the compositor who has the first "take" in the sheet lays up the forme on the imposing stone, as well as corrects his own matter. He then hands the proof to the compositor whose name is written next on the proof, who does the marks occasioned by his own errors. The proof is thus passed on till it reaches the compositor who has the *last* take in the sheet, and he locks up the forme, collects the copy, and sees that both are conveyed to the pressman or proof puller.

If a compositor happens to have matter in the first and in the last part of a sheet, he is usually called upon only to lay up the forme and correct his matter. The compositor who is last but one has to lock up the forme.

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In some houses these rules are modified, to remove hardships which might possibly arise were they carried out in their entirety. The compositor who has set up matter which does not exceed the first page has to lay up only one forme, and the next compositor lays up the next, when the work is imposed in sheets. So, if a man has the last take, and it does not exceed a page, he locks up one forme only, his immediate predecessor locking up the other.

Great responsibility attaches to each compositor at work on a forme composed by several different hands. Any one may do his work so badly or commit such an error as may entail labour and expense upon all concerned. To meet cases of this kind, a rule is enforced to the following effect:—If a forme is broken, or if letters drop out, through carelessness in locking up, the person who locked up must repair the damage.

If, on the other hand, the damage is caused in the process of correction, the person who actually caused it is bound to repair it.

Two examples may elucidate these regulations. 1. A forme may drop out through the quoins being badly fitted, or the furniture binding. In such a case the whole of the composition of the forme would be debited to the locker-up. 2. A forme may drop out through bad justification, the use of wrong spaces or quadrats, or the letters riding upon the end of the leads. In such a case the loss falls upon the person who caused the damage.

An out or a double in a take might cause the whole of the matter in a sheet coming after it to be overrun. This should be done by the compositor committing the error; and he would have to correct any errors incidental to the overrunning caused by his fault.

The person who locks up the forme has, of course, to satisfy himself that all the pages are of equal length. If, however, any imperfection in this respect is unobserved, the next to lock up has to make good any damage to which it leads. By some persons this is regarded as unjust. The

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man who makes up the pages has to see to the length of the pages, and after all the corrections are made the man who corrects the press proof sees to the final gauging, lest any page may have been lengthened or shortened in overrunning.

The responsibility thrown upon each compositor of correcting his own matter is, in some houses, varied in certain cases where waste of time would be occasioned by its being rigidly carried out. It is agreed that if only a certain number of errors are present the proof is not passed on. For instance, A is at work correcting his matter; when he has done, he would in the ordinary course pass on the proof to B, in order that he might do his marks. But if B has less than three marks, A does them for him; and if C follows and has only three, A does them as well, and those of all the other compositors whose errors are below a certain number. This number may be three, five, seven, &c., according to the custom of the house. Although this rule will work inequitably on occasions, it often prevents a man from being taken from work he is engaged upon to do what will require only two or three minutes; these minutes sometimes involving the loss of perhaps an hour in changing work, blunders by being taken suddenly off a job, &c.

The following technical terms, which belong to the process of correction, may here be explained:—

A.P.—Author's Proof.

R.—Revise.

Cancel.—Matter that is set up but not worked off, and therefore ordered to be distributed.

Clearing the Stone.—Removing, after imposition and correction, any letters, leads, furniture, &c., that may remain on it, and replacing them in their proper places.

Double.—An unnecessary repetition of words; as, for instance, *the* set up twice.

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Out.—An omission; a letter, word, or phrase accidentally omitted.

Query.—A question indicated on the margin of a proof, and either written with the letters *Qy*, or the interrogation mark [?].

Quote.—A quotation, marked by turned commas at the beginning and apostrophes at the end; as, Does he say, "I will?"

Qy.—An abbreviation of *Query*.

Specimen.—A properly printed sheet given to the compositor as a sample, and an indication of the style he is to follow.

Turn.—A letter turned upside down, as ɯ, or one placed in such a position that an impression is taken of its feet instead of its face. When matter runs upon sorts, and one character is exhausted before the case is empty, a type is used of the thickness of the one that is short, but with its feet upwards, so that it may not be overlooked in the correction.

It is very important that all the *press* proofs of a work should be kept in pigeon holes in the overseer's closet, or some other safe and accessible place. *Primas* are kept in a drawer or on a file.

The following is the heading of a book kept in some of the large offices, which indicates at a glance the progress of correction of any sheet:—

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NAME OF WORK.	Sig.	Sent to Reader, & Reader's Name.	Sent to Compositor.	Sent out to Author.	Received from Author.	Received for Press.	Sent to Press Reader.	Sent to Press Reviser.	WORKED OFF.

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CHAPTER XVII.

JOBBING WORK—Qualifications of the Jobbing Compositor—Classification of Jobbing Work—Placards—Show-bills—Hand-bills—Circulars—Cards—Blank Forms—Labels—Pamphlets—Sizes of Paper for Jobs—Dimensions of the Regular Papers—The System of Subdivision—The Broad, Long, and Oblong Classes—List of Sizes.

OF the three departments into which practical printing is divided, namely, book work, newspaper work, and jobbing work, book work is that which demands most education; newspaper work most dexterity; and jobbing work most ingenuity and taste.

Jobbing work differs from the other two branches also, in requiring, on the part of the compositor, a thorough acquaintance with the job in hand *as a whole*. In news work a few lines of an article only may be given to a man to compose, and he need not trouble himself in the least in regard to the general subject or purport of the matter in hand. In book work a portion of copy will be allotted to him to set up, and if he observes the general style of the work, it is quite immaterial to him what goes before or after, or whether the work makes two sheets or twenty.

But if the copy given to a man to compose is for a job, he must usually know before he begins to work the size it is intended to be, its general character, and even the portions that are to be emphasized: that is to say, what is the idea of the writer in drawing it up, and what he wishes impressed most forcibly upon the attention of the reader. Hence it is essential that at the outset the job compositor should understand the purport of his copy, and should be able to select without any hesitation the passages that are most important, and, therefore, to be allotted the greatest prominence. To do this accurately and confidently requires thought and decision, and some share of the analytic faculty which it is so desirable to all to cultivate. It is not, however, sufficient to know which are the most

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important passages of a job such as a placard or a circular; it is necessary to know how to give them that prominence by the use of suitable types; and at the same time without infringing the rules of taste which have been gradually laid down in regard to typographic productions.

Classification of Jobbing Work.—In the "Scale of Prices," an official publication of the London Compositors' Union, which determines the rates of wages applicable to the different kinds of compositors' work, there is no definition of what jobbing consists; but in a technical Dictionary (Savage's, published in 1841), it is stated that "a job is anything which, when printed, does not exceed one sheet." This would seem to imply that jobbing work is only a subdivision of bookwork. At the present day, however, job work is held to include certain classes of printing as separate and distinct from bookwork, as that is distinct from newswork.

These classes are not very clearly defined, for the work included in some of them very nearly approaches or even covers that comprised in some others. Without, however, laying down any hard and fast lines, we may roughly divide jobbing work into the following classes:—

1. Placards.
2. Show-bills.
3. Hand-bills.
4. Circulars.
5. Cards.
6. Blank forms.
7. Labels.
8. Pamphlets.

Placards are large printed sheets, intended to be posted on walls, and to be read by passers-by, sometimes at a considerable distance. They are also called broadsides, posting-bills, and bills. The chief descriptions are:—Proclamations, official regulations, auction bills, sermon, bazaar, lecture, theatre and meeting notices, tradesmen's bills, contents bills, lost and found bills.

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Show-bills are a smaller and neater kind of placards, for exhibition in shop windows, inside buildings, and in other places where the reader is comparatively close to them.

Hand-bills are a smaller kind of show-bills, intended to be distributed by hand into the hands of the reader, and therefore not requiring the large type necessary to attract attention in the case of the other two. They may be said to include programmes, play-bills, police notices, and general trade advertisements.

Circulars are a neater kind of hand-bills, intended for distribution through the post or otherwise, and generally under cover of an envelope. There are professional, commercial, and trading circulars, prospectuses of companies, price lists, notices of removal, and opening of new premises, of partnerships formed and dissolved, and many others.

Cards derive their name from the material they are printed on—that is to say, cardboard or pasteboard, cut up in single cards. They are printed with extra care, as they are intended to be preserved for frequent reference. Among the descriptions of card printing are visiting and address cards, invitation and at-home cards, ball programmes, tradesmen's cards, admission tickets, direction cards, calendar and time-table cards, *menu* cards, membership cards, pence and contribution cards, and mourning or memorial cards.

Blank Forms include a great variety of printed matter which is intended to be completed in writing, such as cheques, headings, allotment certificates, memorandums, pawn tickets—in fact, all kinds of forms which require filling up for special use.

Labels are small blank forms, intended to be affixed to goods, such as druggists' labels, and in which part of the reading matter has to be supplied by the pen. Labels are also entirely printed, as the labels on pen and match boxes.

Pamphlets may assume the definition already applied to job work generally, that they are books of not more than one sheet. Pamphlets, however, often run into three or

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four sheets; and perhaps they are better described as small unbound books, or what in France are known as *brochures*. For our present purpose we may include among this kind of work catalogues, as commercial, real estate, produce, furniture, booksellers' catalogues, Acts of Parliament, chancery bills, minutes of evidence, reports, almanacks, conditions of sale, &c.

Sizes of Jobs.—It will be seen that several of the distinctions in the preceding list turn on the *size* of the job; for instance, the difference between a placard and a show-bill. It is highly necessary that the jobbing printer should understand the exact dimensions of all the different kinds of printing and writing paper upon which he may be called on to work; and for two reasons:—

1. If the job is required to be done to the same size as a given specimen, or to some size named, the printer must know how that size is to be obtained.

2. If the size of the job be not specified beforehand, the printer has to determine it, and in determining the size, he has to *avoid waste*.

It is a law of the printing office that every job must be done to some regular size. The size may be that of a sheet when opened and laid out flat—that is, broadside; or it may be that of the sheet folded once across its shortest length or breadth—that is, folio. Or it may be that of some part of the sheet, as a quarter or an eighth—that is, quarto or octavo; but it must be an equal aliquot part, a portion of which a certain number will make a complete sheet.*

There are so many varieties in the sizes of folio papers that almost any size may be obtained by subdivision. We shall, first of all, give a list of the regular sizes, premising, however, that slight discrepancies exist in those of different makers; for the differences that are so inconvenient in

* Exception may be made to this rule in the case of impressions of which a few only are required, wherein the waste does not amount to a great loss; or when there is not sufficient paper in stock of the proper kind to complete a job. For the purpose of printing on small web machines, paper is being supplied in the reel, and may be cut into any size required. We need not, however, at this elementary stage of our work, further refer to this subject.

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types of various foundries are paralleled in the papers of different mills.

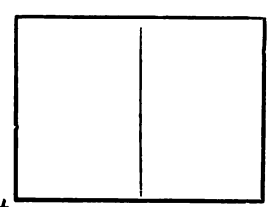
Supposing, then, that the respective sheets are *laid out flat*, the following will be the sizes in inches:—

Name of Paper.	If Writing.	If Printing.	Name of Paper.	If Writing.	If Printing.
Pott	12½ × 15	—	Double Post...		19½ × 31½
Foolscap	13½ × 17	—	Double Crown		20 × 30
Small Post ...	15¼ × 19	15½ × 19	Imperial ...	22 × 30	22½ × 30
Copy	16 × 20	—	Double Demy	—	22½ × 35
Large Post ...	16¾ × 20¾	—			
Demy	15½ × 20	17½ × 22½	DRAWING PAPERS		
Medium	17½ × 22	19 × 24	Colombier ...	23½ × 34½	
Sheet-&-half Post	—	19½ × 23½	Atlas	26 × 36	
Royal	19 × 24	20 × 25	Dbl. Elephant	26¾ × 40	
Super Royal ...	19 × 27	20½ × 27½	Antiquarian...	31 × 53	
Double Foolscap.	16¾ × 27½	17 × 27	Emperor ...	48 × 72	

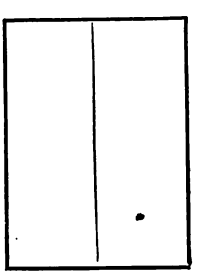
If any of the sheets be folded into *half* its size, that size is called a folio, if into a *fourth* of its size, quarto, and if into an *eighth*, octavo, and so on, through 16mo, 32mo, 64mo, &c. When no other description of the size is given than 8vo, 4to, &c., the size of the sheet is understood to be *demy*.

The folding may be done in different ways, varying thereby the shape of the leaves or pieces into which the sheet is folded or cut.

Broad folio, usually simply called Folio, and Long folio are thus formed:—



Broad Folio.



Long Folio.

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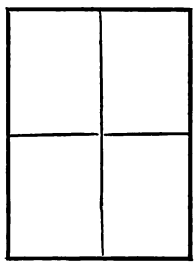
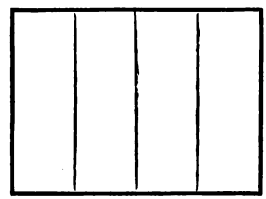
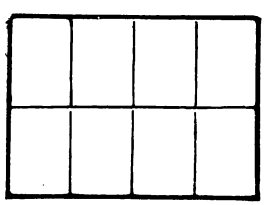
In like manner, by repeated folding, the following sizes are obtained:—



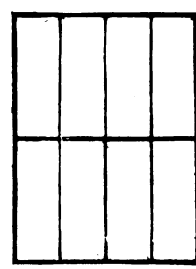
Quarto, or broad 4to.



Long Quarto.



8vo, or Common 8vo.



Long Octavo.

Sixteens (16mo) and Thirty-twos (32mo) are produced by folding 8vo in halves and quarters.

A size is distinguished as *Oblong* when the leaves are arranged to be stitched on the shorter side; and sometimes a section of a sheet is called oblong when the lines run across it in the longest way; but it is better to speak of it as being printed *broadwise*. Oblong folio must be whip-stitched in binding, or else it must be made of paper of double size, cut in half lengthwise.

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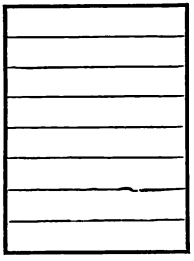
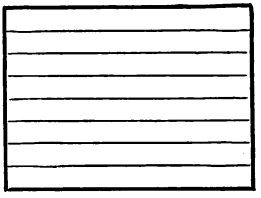
Paper cut in the following manner is said to be cut in *slips*. The slips are distinguished by names determining the number cut from a sheet, and are termed Short or Long, according to the way they are cut across the paper:—



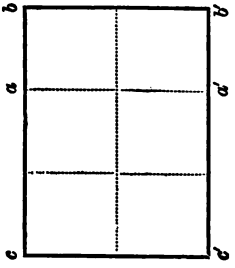
Short slip 8vo.



Long slip 8vo.

There is another important and distinct class of subdivisions not derived from the folio. They are those which result from folding the sheet in three.

If the sheet be folded, as shown in the following diagram, by the dotted horizontal line, it will be divided into thirds, and if folded again, but vertically, it will be divided into sixths; or, as they are called, sixes, or 6to. If another fold be given the sheet will, of course, be divided into twelve (duodecimo, or 12mo):—



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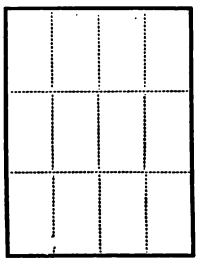
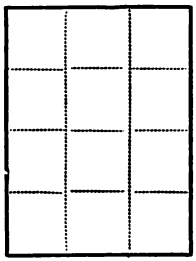
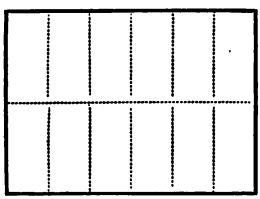
There are three kinds of 12mo in common use.



Duodecimo, or 12*mo.*



Square 12*mo.*



Long 12*mo.*

The way to fold a sheet into Thirds is this:—Estimate by the eye the breadth of the third; a little practice will enable anyone to do this with accuracy. Then make the fold, as at *a a'* in the diagram on preceding page. Now turn the paper so that the section *a a' b b'* is underneath. It is only necessary to divide *c a* into two equal parts, by doubling one edge over another. If these latter halves are not equal respectively to the first third the paper has not been equally divided, and the folding should be rectified.

A division made by folding the sheet the broad way, such as that shown in a preceding diagram, is called Broad or Common thirds, or merely thirds. When the paper is cut longwise, as is shown in the diagram of square 12mo, the sections are called Long thirds.

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For book printing, several new sizes have been introduced. They are:—

Sheet and a-half post	23½	× 19¾	inches.
Sheet and a-half demy... ...	26½	× 22½	,,
Sheet and a-half royal	30	× 25	,,
Sheet and a-half double crown	30	× 30	,,

Each of these is the half of a sheet larger than the usual size.

It will be seen that the *size* of a piece of paper is indicated by the name of the size of *sheet* from which it is cut, such as demy, double crown, &c. The terms octavo, quarto, &c., do not indicate the sizes, but merely denote the number of sections into which the sheet is divided.

Appended will be found a table of the dimensions of all kinds of printing paper in ordinary use, and of their subdivisions. It has been calculated specially for this work, and the sizes given are those actually in use at the present time.

CHAPTER XVIII.

DISPLAY OF TYPE—Importance of an Acquaintance with the Art—Its Essentials—The Principle of Contrasts—How to Display a Placard—Practical Suggestions.

A KNOWLEDGE of the art of displaying type is all-important to the jobbing compositor. Upon this will depend the value of his work, and this latter will determine his value to his employer. If he does not possess the necessary capacity of acquiring this art, and the requisite taste for its proper exercise, he must either be relegated to the class of mere "line setters"—men who can only compose a straightforward paragraph of a newspaper or a book—or he ought to devote himself to some other branch of the printing business altogether.

To some extent this knowledge is essential to the book and the newspaper hand. It will enable the former to set

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A TABLE OF TH

	Broadside	*Long Folio*	*Long Thirds*	*Long Sixes 8vo.*	*Square 12mo.*
DBL. SUPER ROYAL	27½ × 41	13⅜ × 41	9 × 41	3½ × 41	× 13½
DOUBLE ROYAL ..	25 × 40	12½ × 40	8¼ × 40	3⅛ × 40¼	× 13¼
DOUBLE DEMY ..	22½ × 35	11¼ × 35	7½ × 35	2⅜ × 35½	× 12
DOUBLE CROWN ..	20 × 30	10 × 30	6⅔ × 30	2½ × 30½	× 10
DOUBLE POST ..	19½ × 31½	9¾ × 31½	6½ × 31½	2⅛ × 31½	× 10
DOUBLE FOOLSCAP	17 × 27	8½ × 27	5½ × 27	2⅛ × 27⅜	× 9
DOUBLE POTT ..	15½ × 25	7¾ × 25	5 × 25	2 × 25	5 × 8¼
IMPERIAL	22 × 30	11 × 30	7½ × 30	2¾ × 30¼	× 10
SUPER ROYAL ..	20½ × 27½	10¼ × 27½	7 × 27½	2½ × 27½	× 9
ROYAL	20 × 25	10 × 25	6⅔ × 25	2½ × 25	× 8¼
MEDIUM	18½ × 23½	9¼ × 23½	6 × 23½	2¼ × 23½	× 8
DEMY	17½ × 22½	8¾ × 22½	6 × 22½	2¼ × 22½	× 7½
CROWN	15 × 20	7½ × 20	5 × 20	1⅞ × 20	× 6½
POST	15¾ × 19½	8 × 19½	5¼ × 19½	1⅞ × 19½	× 6½
FOOLSCAP	13½ × 17	6⅔ × 17	4½ × 17	1⅔ × 17	× 5⅔
POTT	12½ × 15½	6¼ × 15½	4 × 15½	1½ × 15½	× 5

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up a title-page; in fact, in many of the large London offices the composition of the title-pages of books is entrusted either to jobbing compositors or others who have made that kind of work a specialty. It will enable the latter to set up a good showy advertisement, and while conforming to the general style of the paper, to make the most of the space and the copy that are given to him.

Before the present century printers had but a very limited assortment of types with which to make a display. Within the last fifty years, however, new styles have been introduced in great numbers, and they afford every facility for setting up any kind of job in any desired style. The principal kinds of jobbing type have already been slightly referred to, and the young compositor should in the first place learn to use these with the best effect, and then ascertain what other founts are ready to his hand in the particular office in which he is working, and discover how to adapt these to his purpose in the readiest and most tasteful manner.

If we look at any good piece of work we shall find that its superior showiness or attractiveness arises from the *contrasts* of type which it exhibits. The large and the small lines (the heavy and light letters) emphasise the words contained in it, and impress certain of them more forcibly than others upon the attention. Let him now examine how this contrast is produced. Taking a placard as an example, he will find that there are very large letters used for the very important words—the words that give the key to the piece of literary composition. These large letters are arranged generally in long lines, the full width of the sheet. But these long lines never follow one immediately after the other. There is always a small line between, making a contrast. The large lines are made up of strong, thick-bodied types; the small lines of finer and more delicate ones, constituting another contrast. The large lines, as we have said, are "full out"—the width of the sheet. The short ones are narrow, giving rise to a further contrast. The art of setting up a good placard may be said, in fact, to consist of the art of making effective contrasts.

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It is not possible to lay down abstract rules governing the display of every kind of work, but a few general suggestions may be useful to the inexperienced. The first thing that the compositor should do is to make himself thoroughly acquainted with the nature of the job he has in hand. He must next select in his own mind the lines that are to be the most prominent or attractive, or, in printers' phrase, to be "thrown up." Every job should have one line dominating all the rest; one to which all the others should be subordinate. This line should form the subject of the announcement, or should suggest it. In proportion to this line should all the rest be set up, and none of them ought to overshadow it or reduce its pre-eminence.

This main line should, if possible, always be a full one. There are two reasons for this direction. Any white space at the beginning or end of a line has the effect of apparently reducing its size and force. And, again, white spaces in these positions are objectionable in proportion to their extent.

The leading line should, further, always be in capitals; lower-case letters have uneven whites at top and bottom, which destroy the harmony of a placard. It should, also, be in roman, as italic letters, too, have whites in irregular positions, which detract from the general symmetry of the work. The importance of each of these rules is increased in proportion to the size of the letter employed; indeed, only in very small bills could their non-observance be permitted.

In beginning a placard, some compositors set up the chief display lines first, and then divide the remainder of the space available among the body and the smaller display lines. Others set up the body first, and then the large lines, finishing with the smaller ones. A good compositor, however, seldom requires to do this. He will generally, after a little experience, be able to set the whole straight through, and thus save much calculation, re-setting, and distributing of lines.

The short words, such as and, with, the, &c., which occur in nearly all announcements, form what are called

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the "catch lines." They may be set in very small type compared with the leading lines, but should always be in the centre of the line. Less space may be placed before and after them than is used between large lines.

The leading line should never end with an abbreviated word, as such is not only unsightly, but requires a full point after it; or an extra point if the line already requires a point. This entails a large oblong white space at the side of the line.

The compositor should remember that wide spaces between letters always reduce the boldness and effect of the line. A little contrivance is generally sufficient to obtain a good full line out of the founts in any ordinary jobbing office, and spacing out a word is usually a clumsy expedient necessitated by the carelessness or want of contrivance of the workman.

As a general rule, it is only the letters whose breadth is proportioned to their height that bear spacing at all. If a letter is condensed, that form is supposed to be adopted for the purpose of "getting in" more letters than if it were of the natural proportions. It is absurd, therefore, to space out a condensed letter; why not use an ordinary one? Indeed, spaces between narrow letters are altogether incongruous, and indicate a poverty of ingenuity or of material that a good workman should avoid.

As far as possible, let the large lines be followed and preceded by uniform spaces. If a catch line only intervene between display lines, they need little space above and below the catch lines, for the white at the sides of the latter serve themselves as dividing spaces.

It is often permissible to omit the points, such as the comma and period, at the end of very large lines, on account of the open spaces they create above them. In the text of the placard, the ordinary indentation of the first line of a paragraph, also, need not invariably be observed. The last line of a short paragraph may be placed in the middle, instead of being begun full out.

Within the last few years old-faced types of large size have been made in wood, in order to imitate the old-

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fashioned printing. These letters have the peculiarity of being very light in their general appearance, the stems having an uniformity of strength not to be seen in varying sizes of other founts. Placards set in these are not always displayed according to the ordinary rules, but are often laid out somewhat after the manner of advertisements on a large scale. A line of capital and lower-case letters is allowable occasionally as a leading display line, and other deviations from the ordinary regulations are tolerated.

The huge six, eight, and twelve-sheet bills, intended for posting on unusually large hoardings, are generally *planned* before they are composed, and it is done in this way: The letters to be printed—which are usually very few in proportion to the space to be covered—are set up, and a proof printed on separate pieces of paper. A number of sheets, according to the size of the intended bill, are then laid down on a large bench and pasted together. Then the letters are set down on the sheets, and being loose, their effect in different positions may be easily estimated: or they may be changed if not suitable. When the desired kind of display is attained, the letters are pasted in position and the whole handed over to the compositor as a guide for setting up the job.

Generally, the compositor should so set up his placard that it may fulfil its principal object—that of being read at a distance. The chief lines should be such as to attract the attention of the passer-by, and if he is in any way interested in the subject, to induce him to stop and read the whole. But, as he may be standing at some distance away, the lines that are all-important to the sense should be "thrown up," and the subordinate ones, which frequently suggest themselves, should be kept down. It is often possible to compose a bill in such a manner that only the leading lines are necessary to be read in order that all the sense of the announcement may be gathered. Ingenious people, indeed, often get up a bill which, if the leading lines are read, appears to be a royal proclamation; but if the body (which is in very small type) is read, it is discovered that the whole is a mere tradesman's puff, or an electioneering squib.

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It is generally advisable that the overseer should give the compositor the "cue" in regard to the effect that the bill is to aim at. This he may do by underscoring with three or two or one lines words that are to be rendered most prominent.

The secret of expedition in bill-setting is to decide, mentally, at once, what letter the principal lines are to be set in, and to let the arrangement stand, working up to them in those that follow, and at the same time setting up the whole job straight through. Experimenting with two or three founts is most wasteful of time, and alterations frequently beget other alterations; not seldom necessitating the composition of the principal parts of the bill two or three times over.

Bearing in mind these directions, the compositor may begin to set up his bill. He will have his lines on an imposing surface, or the table of the press, or on a letter-board. Either of the two first are preferable to the latter, as it is always dangerous to lock up a large forme on a board.

He must next get a large composing-stick—a wooden one if the job be a placard—and "make the measure." This will depend on the size of the sheet. We have already given a table of the dimensions in inches of different kinds of papers, and it is only necessary to multiply the number of inches in the width by six to convert that number into pica ems. A certain number of these must be deducted for the margins at each side. These margins generally vary according to the size of the sheet; it is usual to give a larger proportionate margin to a large sheet than a smaller one. The exact amount of margin cannot be stated; it depends on the nature of the job and the taste of the compositor. Open jobs also require more margin than very heavy ones. The margin may depend also, to some extent, upon the reglets that are available. It is usual for the overseer to state how many ems the bill is to be set to, or for the compositor to be supplied with a specimen.

Next get a broadside chase of the proper size; it should be as near the size of the matter as possible;

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making due allowance for space necessary to lock up in. It is very dangerous to have too much space in the chase, as it has to be filled up with furniture or reglet, which have a tendency to "spring," and cause the forme to fall out. Besides, this unnecessary furniture round the forme is apt to catch the rollers and get inked, causing the margin of the printed sheet to be blacked.

Next select reglets of the right length. Being intended to be used between the lines, to space them out, and to strengthen them, it is very important that the reglets should be of uniform length. Take up a handful and set them on end, and their evenness may at once be seen.

Unscrew the stick, and place in it as many ems of pica as there are in the width of the lines to be set. If the line is very wide, this may be done with leads, which are generally sufficiently "true" for the purpose. Reglets are generally a little shorter than the proper number of ems they are supposed to be cut to, which is an advantage, as the lines can be set a little longer, say a half nonpareil at each end, and when locked up receive all the tightening effect of the quoins. If the reglets are of full length, the line should be a little longer. Carefully screw up the stick when the measure has been made.

Place at the left hand side of the chase (when you stand at its head) a piece of furniture running down the entire length. Then place at the head another piece. These are to prevent the types coming in contact with the chase, and thus getting injured. They also permit of a better lock-up, for the wood slightly gives way to the metal, and the whole is more firmly bound together. The size of the furniture will, of course, depend on the space the chase allows for locking up. The forme should lie as nearly as possible in the middle of the chase.

Setting the types in the stick is done just the same as if they were small letters. They should, of course, be set from left to right, with their heads lying against the top flange of the composing stick. The only difficulty the compositor will have will be in the spacing-out. Large founts of type do not contain spaces or quadrats, and in place of them metal furniture, quotations, or even leads,

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have to be used. Pieces of card, cut like leads, are also employed occasionally, but they should be had recourse to as seldom as possible. As much care should be used in justifying a line of a placard as a line of a book.

In setting catch lines in sizes like two-line great primer, it is usual, in order to economise quadrats and to make the line stronger (by being in fewer pieces), to use furniture. The latter may be extended with quadrats when necessary, but these should also be placed next to the type.

There are certain large letters that cannot be always used close together, such as IL in sanseriff, as the two heavy down strokes coming together would simply coalesce and be illegible. In such a case a space must be put between them—a lead, for instance. Indeed, several founts require to be spaced out, so that the accidental coming together of certain of the letters may not disfigure the line, and the white between each may at least approach to uniformity. On the other hand, there are some letters that, when placed together, leave spaces that are too large. A portion of these may be cut away, as the white of the letter L when it is to come next to a type such as T.

Before deciding on any particular letter for a line, see that you have sufficient types in which to set it. Some bill type founts are very small, and words may occur containing more letters of one kind than the fount possesses. This causes much trouble and loss of time. Generally speaking, it is very bad economy on the part of printers to buy very small founts of jobbing type. A small number of large founts is in most cases much preferable to a large number of small founts. Many employers remain quite ignorant of the time wasted by the compositors through having to change lines owing to a deficiency of some particular letter. This waste of time amounts in money very soon to what would actually buy a new fount. Wood founts, too, may always be easily enlarged, and the cost of extra sorts is not much in advance of that of the body of the founts; in this respect they are different from metal type, and there is the less reason why they should be short of sorts.

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Many placards are of a composite character; that is, they consist of several sheets, from two sheets double demy to a dozen or more sheets. It is always advisable to set up the whole of a bill before any portion of it is worked off; as only by doing so can the general effect be ascertained.

If there are woodcuts or stereo blocks in a bill, they require to be carefully justified with furniture, leads, or quadrats. There should be no open spaces or "holes" in a placard forme; otherwise it is very liable to fall out into pie.

Care should be taken not to fill up a long broadside stick with small type. If there is too much letter in it, it cannot be safely emptied; indeed, the stick should be emptied as often as possible, for safety sake.

Whenever practicable, lines should be justified in the stick; if the letters are too large, they may be justified out of it, but it is not desirable to do so.

When the whole of the bill has been set up, the imprint may be added, if there is to be one. Its size will depend upon the size of the general lines in the bill, and should be a little smaller than that of the body letter.

Finally, measure what you have composed, and see if it will "come in" the sheet. If it will not, a little space may perhaps be taken away from between some of the lines; if even that will not bring it within the necessary compass, see whether some one or more of the paragraphs may not be overrun and a line saved. If this is not sufficient, some of the catch lines may be, perhaps, saved, or run into others. If more compression is still wanted, there is nothing for it but to reduce some of the large lines, beginning with the secondary ones. But this should seldom or never occur; and when it does occur it indicates inexperience or ill judgment on the part of the compositor.

All being finished, run a reglet down the other side of the forme, to protect it from the sidestick, especially if it be a metal one. Put in the sidestick—a full length one if possible; if not, two, with the heads in the same direction

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—and the footstick, with a reglet between it and the last line. Then fit in the quoins, plane down, and lock up, as has already been described.

We must defer to another part of our treatise the consideration of placards printed in more than one colour.

The young compositor will find it very advantageous to study, as he goes along, the placards on the walls, and to note and record any specially good effect that they may exhibit, so that when called upon he may be able to produce work of a similar excellence.

It is a good plan to aim at getting the chief lines near the middle of the bill, if possible. If they are all at the top or towards the bottom an inartistic appearance is given to the job.

In taking orders for placards, printers should point out to their customers the great importance and advantage of using as few words as possible, and show them how the attractiveness of the work is enhanced by its containing no superfluous lines. They may illustrate this by exhibiting a few specimens of good bills (an assortment of which should always be at hand), and when the customer has selected his style, the bill may be shown to the compositor as a model to be followed.

CHAPTER XIX.

CARDS—Names, Sizes, and Qualities of the different sorts of Cards — Hints on Setting up—Ornaments for Cards.

CARDS, so named from the material upon which they are printed, are of various kinds, such as business cards, address cards, visiting cards, direction cards, tickets of admission, menu cards, memorial cards, membership cards.

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Cards are pieces of cardboard cut up to certain standard sizes, which are:—

Third Large	.....	$1\frac{1}{2}$	by 3
Extra Third Large	.....	$1\frac{7}{8}$	„ 3
Town Size	.....	$2\frac{1}{16}$	„ 3
Half Small	.....	$1\frac{7}{8}$	„ $2\frac{3}{8}$
Half Large	.....	$2\frac{1}{4}$	„ 3
Reduced Small	.....	$2\frac{1}{8}$	„ $3\frac{9}{16}$
Small	.....	$2\frac{3}{8}$	„ $3\frac{5}{8}$
Large	.....	3	, $4\frac{1}{2}$
Double Small	.....	$3\frac{5}{8}$	„ $4\frac{3}{4}$
Double Large	.....	$4\frac{1}{2}$	„ $6\frac{1}{8}$
Quadruple Small	.....	$4\frac{3}{4}$	„ $7\frac{1}{4}$
Quadruple Large	.....	6	„ 9

There are also the two sizes (seldom, however, used by printers), Carte de Visite, which is $2\frac{7}{16}$ by 4, and Cabinet, which is $4\frac{1}{4}$ by $6\frac{1}{2}$.

Memorial cards are of two sizes, single ones being 3 by $4\frac{1}{2}$ (that is, a large card), and double ones, 3 by 9. The latter are folded to form four oblong pages. Ordinary cards of any size, however, may be black bordered.

The sizes of Visiting cards are, gentlemen's, $1\frac{1}{2}$ by 3, ladies', $2\frac{1}{2}$ by $3\frac{1}{2}$.

The qualities of cards are very various, and should be understood by the printer, before beginning the job. There are the *plain* cards, which are pieces of cardboard cut up to sizes. Each maker has his own peculiar terms for particular sorts and qualities, such as machine printers', fine printers', fine commercial, superfine commercial, extra superfine commercial. Then there are *ivory* cards, very thin, semi-transparent, and of a very pure material, made in at least two qualities, fine and superfine, there being two degrees of thickness to each. The next kind of cards is the *enamelled*, which are covered with a preparation of white lead and highly glazed. They are made in about six different qualities. Another kind of cards is the *surface coloured*, which have a body colour laid on, and are

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slightly glazed; and *tinted cards*, which are made of a coloured pulp.

These cards are usually made up into packs, containing fifty-two each.

A commoner kind of cards, yet suitable for cheap work, is that known as "waste" cards. These are made to the usual sizes in different qualities, thin and thick, and sold by the pound. The thin cards are the highest priced by the pound, but as a much larger number go to that weight, they are usually the cheapest per hundred.

There is no branch of jobbing work which demands more good taste, ingenuity, and skill than the composition of a card. Even with the possession of these, the workman must have good material to use; otherwise his best efforts will be marred.

When the copy of a *business card* is placed before the compositor he must consider what lines require the greatest prominence. The solution of this problem will be facilitated if he asks himself, first of all, What is the object of printing the card? Suppose it to be advertising a certain trade. That Trade, then, must be the largest line; the others must be subordinate to it. The person into whose hands the card finds its way, being apprised of the nature of the business, may next wish to know by whom it was carried on. Hence the Name should have the next degree of prominence. After that it may be asked, *Where* is the business carried on? Hence the Address must be next in proportion. Any other lines must give way to these.

This rule is not inflexible, yet it will generally be found applicable. In carrying it out, the principles of display of letter, already referred to, must be taken into account. As far as possible, the long and short lines should alternate. There must be a contrast between them; yet the contrast must not be too violent.

It would be useless, however, to lay down a hard and fast rule on this subject. Very often the singularity of a piece of composition of this kind is its chief recommendation;

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and the novelty of its style may attract attention which its subject-matter would not. It is a recommendation to a card to possess an individuality of its own; one which makes it something different to what has been seen before. It would, however, occupy too much of our space were we to attempt to exemplify any of the myriads of styles which the ingenious compositor may originate.

We may remark here that it is extremely bad taste to attempt to imitate lithography or copperplate engraving by the use of types. The freedom and variety of alignment, so easy in the other two kinds of printing, are quite unattainable with rectangular letters; while the inevitable break between the types, even of the best script, and their obvious stiffness, should dissuade the printer from attempting anything that belongs in nowise to his branch of work.

Visiting Cards usually contain only a name, and may be set in black letter or script; but they would be best left to be done by the engraver. In America these cards often contain simply an autograph; that is, a facsimile of their owner's handwriting; which is made by wood engraving. Provided the handwriting is legible (which autographs are often not), a card of this kind is somewhat attractive. Lithography, however, would do the work much better than the letter-press.

Direction Cards are usually of a rough description, printed in plain, bold, and strong types. They follow no rule as to display, and are merely set up in the style that is most legible.

Admission Tickets.—These will follow the same rules, generally speaking, as ordinary business cards. The object of the card—lecture, meeting, dinner, tea party, &c.—should be the chief line; and the other lines should be in prominence proportionate to it. Cards of this kind are generally set up in plain, bold characters; but for occasions such as a ball, a conversazione, or a concert, a rather more fanciful character may be imparted to the composition.

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Address Cards usually consist of a name only and a residence. They may be set up in a black or Old English letter or in a script—either of which will imitate engraving.

Menu Cards consist chiefly of a list of the dishes, and only their titles afford an opportunity for display. The front and last pages of these cards are often very elaborately printed, in various colours, and ornamented with gold and silver bronze. Several offices in London almost confine themselves to this kind of work, and have attained a degree of perfection in it which is almost beyond the reach of the general printer.

Memorial Cards differ, of course, from business or complimentary cards. Formerly they were nearly always printed in as sombre-looking letters as possible; often entirely in sanseriff, the only variety allowed being in making the name and the age lines a little larger than the rest. This style is still popular, but better and brighter fashions have now set in.

When composed partly in roman, a line or two of clarendon, sanseriff, or text letter is generally introduced.

The "Catholic Revival" in the Church of England has effected a remarkable change in the style of memorial cards. The brightest colours are now frequently employed, as they are regarded as appropriate to the thought that "death is the gate of life," the prelude to a brighter hereafter; and the card should be symbolic of hope, not of despair. Black letters with rubrications (in red) may be used; but violet letters seem to be thought by some the most appropriate. If black letters are used, the black edge on the card may be dispensed with, and a violet bordering substituted for it. These cards, being usually surmounted by a latin cross (generally printed in red), and containing the aspiration R.I.P. at the foot, are generally printed the narrow way of the card, and not the broad way, as are most other cards.

Very chaste cards have been printed in imitation of the style of the inscriptions on old brasses in cathedral and

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other churches. They are set altogether in text letters; the initial letters of the nouns are worked in red, the other portion in black. The whole is run on, like a common paragraph. A point, like a full point, but cast on the middle of the body (in the same position as a hyphen), may be placed between each word; these points should be in red. The working requires great accuracy, but the effect is worth the pains taken to accomplish it.

If a memorial card be set up in ordinary capitals or sanseriff letter, the lines should be varied so as to be long and short, and all centred, as we see monumental inscriptions set out by the sculptors.

Contribution and Pence Cards may be said to be little more than specimens of table work. If only a short number is required, the horizontal lines may be set up in one forme, and the perpendicular lines in another, when, by two workings, the card will be completed. This often saves much trouble, especially if there are many columns in the cards.

Show Cards belong to a branch of jobbing which will be referred to hereafter.

We will now refer to some kinds of typographical embellishments which belong more especially to card composition, although they are partly applicable to other kinds of jobs.

Metal Rule.—A great variety of effects can be produced by a judicious use of metal rules; which may now be had from the founders in upwards of 100 different designs. This kind of rule may be cut up with the mitreing machine like brass rule; and in many cases it is superior to brass rule (although very much cheaper) for making borders, &c., to cards. It requires more careful manipulation than brass rule, but the common belief that it is so very liable to become battered is quite unfounded.

French Rules and Ornamental Dashes.—These are equally available for circulars, show cards, &c. They avoid the bare appearance often presented when brass

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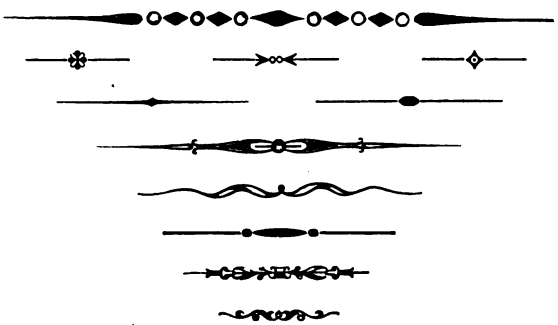
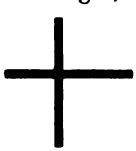
rules or metal dashes are used. French rules (sometimes called "swell rules") are generally made to nonpareil or brevier body, and to various lengths. They are cut in solid brass. Ornamental dashes are cut sometimes in brass and sometimes cast in type metal. The following are a few examples:—



Oxford Corners.—These well-known corners may be made up with rules, or bought from the type founders. In the former case it is best to make the largest rules the full length, and to piece the shortest ones. The projections from the square are generally equal to one pica; the white open space may be made up with pica quadrats, which must be well justified or the rules will not meet nicely. Corners of this shape, however, save trouble frequently, as they can easily be adjusted round any forme. They may either be cast solid, or consist of two pieces of brass rule, fastened together.



Mitreing Rules.—In card work, if there is a border of rule, great care should be taken to make the ends meet closely, and this only can be done by mitreing them.

Mitreing is done in two ways: either by a mitreing guard or a mitreing machine. The first is a kind of long narrow box which is held in the left hand. It contains a set screw, by which the rule, previously cut to the required

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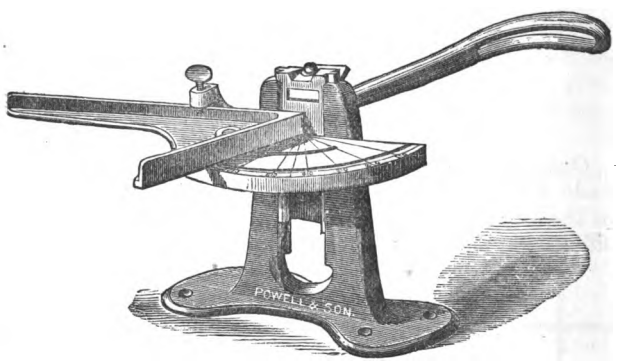
length, is securely fixed, the portion to be taken off projecting. Two files are provided—one rough, one fine. One end of the guard is cut off at a common mitre, or an angle of 45 degrees. Taking the rough file in the right hand, the workman files away at the projecting portion of the rule until no more can be taken off. The smooth file is next taken up and any roughness on the rule removed. The face of the guard being of hardened steel will allow no more to be taken off than is necessary to produce the angle.

The mitreing machine is a more perfect and convenient apparatus. By loosening the screw the square or any other angle may be produced. The lever arm dispenses with



the use of files. The machine may be screwed down to the end of a bulk or a bench, and the workman when using it has his left hand at liberty to steady the rule. One like that shown above costs about two guineas.

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CHAPTER XX.

DESIGN IN COMPOSITION—Method of Setting Curved Lines—Line Formers—Ornamental Brass Rule—Rule Bending Apparatus.

BEFORE beginning to set up a fancy job in which curved lines and ornamental rules form the chief feature, it is advisable to make a design. This design will gauge the character of the work when executed; hence the importance of having it well considered.

The design must be both practical and in good taste. By practical, we mean it must be one that can be carried out with types. There are some designs that would answer very well for a wood engraving, but cannot be set up with the ordinary contents of cases, rule drawers, and furniture racks.

In regard to good taste, it may be said that there are certain designs that no one of any refinement or education will even for a moment countenance. Among these are representations of natural objects. Such are altogether beyond the province of ornament. A great deal may be done with borders and rules, but in the manner only that the old printers—who were men of taste—artists in their way—used them, as *conventional* ornaments. Their very stiffness, symmetry, and regularity harmonised with the inevitably rigid condition of every kind of type, and it is only as conventional ornamentation—not natural—that we can for a moment countenance any embellishment in typography.

Some introductory instructions in the art of setting curved lines have already been given, and the young printer is therefore prepared to experiment on more elaborate work of a similar kind.

Making the Curve by curvilinear quadrats.—Annexed is

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an illustration of these quadrats, or furniture, as they might more properly be called.

The height of these quadrats is that of the ordinary rectangular ones. It will be seen that the upper and lower sets of the curvilinear quadrats have respectively a convex and a concave surface. The line of type is intended to be placed between. The right angles outside may be filled with ordinary quads or lines of type matter.

The sizes of these quadrats are so arranged as to form circles from 1 to 24 inches in diameter. Each space is one-eighth of a full circle, and when combined with similar pieces will form quarter, half, three-quarter, and full circles. By reversing the combination of some of the pieces, serpentine and eccentric curves may be made of any length or depth. Other quadrats are made, especially for serpentine lines, of which the following is a specimen :—

Whatever the curve, the two inner surfaces of the quadrats must be parallel to each other, so that when locked up the type will be held firmly between them.

By some makers the quadrats are marked with certain numbers, indicating the length in pica ems, or corresponding with a scheme sent with each assortment.

Take two outer quadrats of the same number, or if there is no number on them, ascertain that they are both of the same size and class, and place them in position in a

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composing stick, as shown in the diagram; that is, reversed, as an ordinary line is set up.

Set up the line of type in the hollow of the curve, but without justifying it. Next insert two inner quadrats of the same number or description, but of smaller size than the outer quadrats. Remember that the size of the inner quadrats, proportionate to the outer, depends upon the size of the type introduced. A line of great primer will require smaller quadrats, for instance, than a line of pica, and *vice versâ*—as one increases in size, the other diminishes. Any clock dial will afford an illustration of the reason for this. The space between the numerals XII and III is a quarter of a circle. A line described round the foot of these would be much less curved than one at the top. If the size of the numerals were increased, the inner curve would be smaller; if decreased, the inner curve would be larger. This will explain why the inner quadrat should be of less size than the outer, and why it should diminish as the type increases.

Assure yourself that the curve of the inner quadrat is perfectly parallel in every part with the curve of the outer quadrat. If the two are not parallel, they will not bind the type, and it will fall out in lifting, and cause much inconvenience.

Next justify the line of type. On this point, however, we will have some remarks to make presently. If the type does not meet the curve as closely as is desirable, slips of cardboard may be introduced, but they should be of the same length as the line of type. The slip of card increases the distance between the quadrats, until their curved surfaces are exactly parallel with each other.

Quadrats thus justified will be also square and level on the outer sides, which is of equal importance with

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parallelism on the inner curves. Unless they are so, the justification is not good, as it has to be done, of course, with the ordinary rectangular quadrats. If, indeed, the outer surfaces are not quite level and straight, the direction of the inner curves must be changed, and adapted to make them so. The type outside should be perfectly level, and all the spaces and quadrats secure and tight.

The reader should be cautioned that these quadrats cannot be enlarged or reduced. They are perfect segments of circles, and increasing or diminishing them destroys the truth of the curve. If the thin ends are pierced out with ordinary quadrats, good justification will be rendered impossible. If they are shortened by being cut they are simply useless. Neither is it practicable to alter their form by short pieces of card or lead; for to do so destroys their parallelism. Very accurate justification of the outer extremities of the quadrats is also indispensable.

If the curved surfaces are kept parallel, and the flat surfaces are kept quite square, no difficulty will be met with in setting the other parts of the forme.

For general work there are better ways, however, of making curved lines than with curvilinear quadrats. Although the latter are cut out as shown in the diagram at the outer sides in order that lines or portions of type work may be introduced, they necessitate a considerable amount of open white space; as much, in fact, as is shown black in the diagram. Hence, for some kinds of small work, they are useless, for they require more margin than can be allowed.

Another way of making curved lines is to use ordinary leads or brass space lines and to bend them to the curve desired. We will now give a few practical hints as to how such work may be done.

Take a galley with *three* bevelled edges or sides, and set it up on the frame with the head in a horizontal position. Place a piece of metal furniture of the full width of the job against the head of the galley. Now put a piece of furniture of the same length, or a little longer than the depth of the job, against the end of it, so as to run down the ends of the lines when they are set up. Fill up the remaining space between this piece of furniture and the

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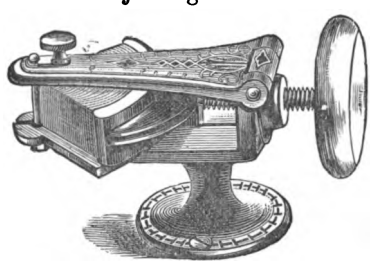
side of the galley with more furniture and a side-stick and quoins. This is to form a foundation for the work and to enable the lines to be spaced out; in short, it forms a kind of composing stick. We will suppose that the width of the work is to be 21 ems, and the curve desired one graduating from the centre downwards. The two end points should be about 3 ems pica lower than the centre point. Put two 3 em pica quadrats against the head piece of furniture (which should be about a 4 em thick), one at each side.

Now take a lead or brass space line, 23 ems long, and bend it to the curve required. Do this very gradually, and uniformly at each side, so that both ends shall fit fairly against the quadrats already placed there.

The bending of the brass may generally be done with the fingers. A small pair of pliers may be used, but they are apt to make irregular and sudden bends. A round wooden block may also be used; or the brass may be hammered against the edge of a round piece of board, or even an old strong tin can.*

Leads are more brittle, and there is danger of breaking them. For this reason they should be passed occasionally through the flame of a jet of gas.



The *Bending Apparatus* enables ordinary brass rule to be

* Brass rule consists of thin strips of metal of the height of type, which are used for forming lines. It is generally manufactured in lengths of sixteen or twenty-four inches, and of thickness corresponding to that of leads, and with faces of various breadth or darkness. There are two qualities of rule: spring or hard brass rule, which, if bent, recovers itself when the pressure is removed; and soft rule, which always retains the shape to which it is bent. The former, however, may be made to retain any required shape by heating it until about to turn red, and then immersing it in cold water.

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curved to various ornamental shapes with the greatest ease. The rule which is to be bent should be placed between the brass segments; then close the lid and lock it; afterwards turn the screw. Before the rule is bent, cut it to the right size, and place exactly in the middle. It is better, when using metal rules, to hold them over a gas or spirit flame before bending.

With this apparatus it is possible to make right-angle corners and also round corners, and for this purpose are supplied two steel dies. Take out nine of the smallest brass segments, putting in their place the two steel dies, lay the rule in the exact middle, and turn the screw. Care must be taken, before screwing up the segments, that the lid is shut and locked—through neglect of this the pin is likely to be bent or broken.

In selecting the type to be used in the curve, let it be as square as possible; that is, let it have as little divergence from the normal body as possible. The effect will be much better than that from the use of a condensed or expanded letter. Let the line fill the whole of the curve, without spacing if possible. Spacing nearly always spoils the effect.

When the types are so placed, it will be found that they touch each other at the bottom of the face, but an open space is left at the top. This forms the chief difficulty in work of this kind, for this wedge-shaped space has to be filled up in part by rectangular spaces. The larger the curve of the circle or the semicircle and the larger the type used, the larger will be the space between the heads of the different letters. The only way to do is to fill up with smaller spaces than those of the body. If pica is used as a type, nonpareil spaces may be required to fill up the interstices. They must be very carefully introduced, and not interfere with regularity of the curve; otherwise the good effect of the work will be lost.

When the line is as well spaced out as is practicable, take a lead about 23 ems long and bend it, as before, and apply it to the bottom of the line. There will now be left an open space larger in the centre than at the ends, which

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must be filled up with something. Another line may be accommodated, but still an open space will be left. The best filling is a quantity of small pieces of lead, gradually increasing in length. Pieced leads and reglets should be avoided, as they fail to give the job that solidity and firmness which are essential to its successful completion.

Even with the use of graduated leads, open spaces will remain. Sometimes this open space may be filled up with paper, damped till it almost becomes pulp, and pushed in with the pieces, something in the manner of stopping a hollow tooth. Ground plaster of Paris may also be mixed with water to the consistency of a thin paste, and carefully poured into the interstices. When the water evaporates and the plaster is dry, it will make the whole quite strong and firm, but there is sometimes trouble in printing from such a forme, as the plaster is apt to get cracked and to break off in flakes. Of course, printing from such a forme may be avoided by having it stereotyped or electrotyped. But both of these expedients are clumsy and uncleanly, and should be dispensed with. Quadrats and spaces are far better, and a little trouble and the display of some ingenuity in placing them will be amply repaid, and answer every requirement.

If the curve is reversed, tending from the centre upwards, as would be the case at the bottom of a job, the openings between the letters will, of course, be found at the bottom, not at the top of the face.

The other kind of curve, the serpentine one, is not generally so effective, and it always entails more trouble. It may be said to combine the two already mentioned—the upright and the downward tending curve. The rule or lead for this curve is prepared as before, only that more care must be exercised so as to get the two extreme ends of the lead in a line parallel with the centre; and the geometrically correct appearance of such a line is altogether dependent upon getting the three letters which will fall in the middle of the two downward and the one upward curve in their proper positions. These, if properly placed, serve as a guide for placing the others. The

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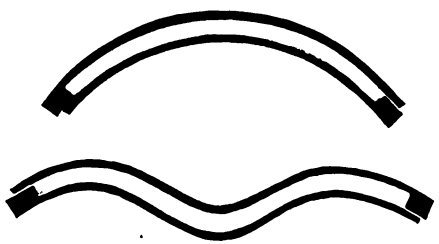
spacing will depend on the curve, and will have to be done alternately at the top and at the bottom of the faces of the types.

In order to save printers the trouble of bending brass space lines or leads, "curves and clamps" have been introduced by Messrs. Caslon and Co., under the name of "Line Formers." Annexed is a diagram of two sets of them, the down-tending and the serpentine form.



To illustrate the use of these curves we append the following example:—

The manner of using the curves is similar to that already explained. The stop, which is intended to assist in the justification, was invented by Messrs. H. W. Caslon & Co. The curves, indeed, may be said to enable the printer to do in spring rule what he had been accustomed to do by bending soft rule.

A variety of ornamental forms may be made by the judicious use of bent space lines and leads in combination with rule. The *Pall Mall Gazette* often presents ingenious specimens of maps, plans, and diagrams displayed in this way. All the rules are cut, bent, and curved as wanted,

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and only the ordinary materials found in an office are permitted to be used.

Brass rules are of various designs, and much variety may be effected by combining them. The ordinary faces are as follows:—

PLAIN RULE.

WAVED RULE.

DOTTED RULE.

DOUBLE FINE RULE.

TREBLE RULE.

VANDYKE OR ORNAMENTAL RULE.

The waved rule may be beaten out at the ends into a flat straight line with a hammer, and then rubbed off to a point on an imposing stone or a rough chase. It then makes a design of this kind:—

In regard to *Oxford Corners*, it should be remembered that unless they are well justified the joinings are seen, and the job will lose much of its effect. Corners of various sizes in type metal are also supplied by the founders. When a single or double line requires to be run round a page it is only

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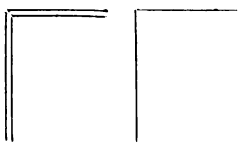
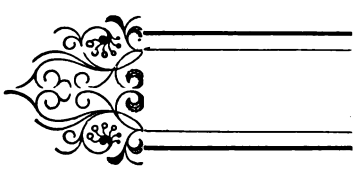
necessary to choose rules of the proper length, and the locking up of the forme, if all is done very accurately, ought to bring their ends together. In practice, however, this is seldom accomplished, and at the outer angles there are open spaces, caused by the rule not joining. Hence, brass corner-rules have been introduced, both single and double. thus,  When they are used, the rules require to be as much shorter as they are long. A better plan than this (for it often results in the white space in the corner merely being removed and repeated at the points where the rules and the corners come together) is to adopt brass clamps, the height of leads. They are used in conjunction with full length border rules, and serve to bind them together at the point of junction, as well as to make the forme generally more firm and secure.

In connection with curved lines and line formers, mention may be made of the flourishes which are now supplied in brass rule. They occupy the place of clamps, and sometimes are very effective.

Frequently, also, pieces of border may be tastefully introduced in connection with brass rules, to make tablets in the middle of a job, thus :—



Labels and jobs completely surrounded with oval and circular borders are, however, best made by the use of the rigid or cast circles and ovals now supplied by the type-founders. These circles, &c., are made to various sizes, and the compositor can generally arrange his work to make use of one of them. The outside bodies may be

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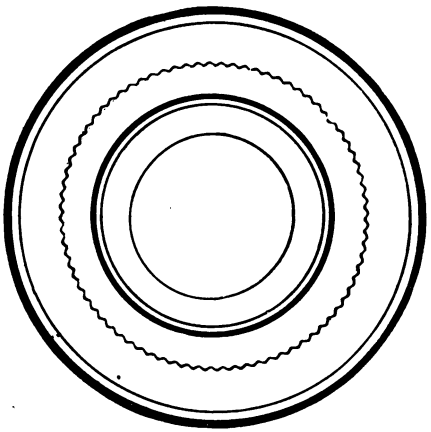
quite square, and the circles cast to six-tenths of an inch in diameter.



There is, however, a difficulty in inserting the lines, especially if a line has to run all round inside the circle. The first thing to be done is to get a starting point. Cut a small strip of thin glazed board or cardboard about the width of a lead, and then bend this so as to form an inner circle *outside* the line to be inserted. If the line to be inserted round the circle were nonpareil body, the diameter of the cardboard circle would be two nonpareils, or one pica smaller than that of the brass inside. The galley should, for this kind of work, be laid flat and not sloping. Then damp slightly the line that is to be inserted, and begin to justify it between these two circles. Should the two ends of the cardboard circle overlap each other, it may be as well to apply a little thin paste to them, and after the line has been properly spaced out, this will allow of the cardboard being stretched with a bodkin, so as to make it rest firmly against the line of type. This will give it a greater degree of firmness than it would otherwise possess. Usually it will be found necessary to line the inner side of the circle with cardboard, to prevent the type from riding close against the brass.

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CHAPTER XXI.

NEWS WORK—System of Setting up a Weekly Newspaper—The Printer and the Compositors—Duties of each—Arrangement of Time—Making Up—How News Compositors' Accounts are kept —Advertisements.

IN order to make clear to the uninitiated the peculiarities of newspaper work, we think it is desirable to depart from the usual routine of the text books in printing, which give merely a few abstract rules on the subject, and present our readers with a sketch of the arrangement, management, and practical working of an office in which this kind of printing is done. The particulars following are derived from experience in one of the best-conducted London establishments; and although in some respects not perhaps universally applicable, they completely illustrate the *system* which ought to be adopted everywhere, and may show the young compositor what is expected of him if he devotes himself to the newspaper branch of the business.

With this view, we will suppose that the journal to be printed is one of the *Spectator* or *Examiner* class, consisting of between twenty or thirty pages, each of which contains two wide columns; except the advertisement pages, which are set to a narrower measure, and usually contain three columns, or one double column and one single. We must pass over the literary and editorial part of the staff. The former may consist of regular contributors, reporters, and the leader writers; the latter of the editor who decides upon the articles that are to be inserted, and the sub-editor who compiles the miscellaneous columns, selects the "padding," and carefully reads over the whole paper, partly to see that nothing is inserted that is inconsistent with the policy of the paper, and partly in order that nothing may be inserted twice over, or in a form that is opposed to the general make-up of the journal. The editor and sub-editor supply the printing office with the "copy," which usually is marked at the head with the name of the type in which it is to be

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composed, and generally at the end is placed the name of the contributor, or a mark settling his identity, in order that he may be known subsequently should such be necessary. The sub-editor also marks the copy with the heading under which the matter is to appear in the paper, such as "Home," "Foreign," "Miscellaneous," &c. With these indications upon it the copy comes into the printing office.

A newspaper office is generally superintended by an overseer who is called "the printer." It is he who is called upon to meet the editor or sub-editor, afford them explanations and information of the state of the work, and receive the instructions which his subordinates are expected to follow. The printer is responsible for the safe custody and due return of the copy, for getting the paper to press in time, and is called upon to check the accounts of the compositors, to make up the bill for the work as a whole, and sometimes to pay the hands individually. He must be a man of perfect steadiness, judgment, coolness, and decisiveness; and although he does not work himself, he should know all about the work, and be able to take a share in it on an emergency. A printer is usually paid from 50s. to 60s. per week and upwards.

When the copy arrives, it is taken in hand by the printer, who first of all divides it into "takes" or short portions, distributing these among the various compositors. A take usually consists of a little more than a stickful of matter, but it varies sometimes, for if a new paragraph occurs it is not overlooked. These takes are carefully numbered, and a list is kept of the compositors who take the several pieces. It is not usual to select the matter for any man, and each receives what copy is uppermost on the printer's desk; but if there is any "fat," which recurs regularly, it is given out to different men in rotation, as far as possible. This is especially the case where there is a column, such as poetry, which goes in every week.

The compositor who has the first take of any article is expected to get out a galley for his own and his successors'

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matter. At the head a "direction line" is placed. This is set up in type and is pulled along with the matter up to the time when it is made up into the forme, but it is then left out. It is a line indicating as concisely as possible the section of the journal under which the matter is to appear—as "home," "foreign," "colonial," &c., and is chiefly a guide to the maker-up. If an article extends over a galley, a second but shortened direction line must be inserted at the head of the latter. For these lines compositors do not charge; hence they are generally kept standing if possible. Besides the subject of the matter, the direction line should indicate the number of the galley, if there is more than one galley devoted to that kind of matter, as "home 1," "home 2," "home 3," and so on. It will sometimes happen that a variety of short takes belonging to different sections have to be laid down on one galley. In such a case each will have its own proper direction line.

As each man finishes his portion of copy he empties his matter on the proper galley, in proper order. Thus, if he who has No. 5 piece finds that No. 4 is not on the galley, he leaves a space for it. The man who has the last piece of copy, or whose take will fill the galley, pushes up all the matter close together, and then puts a sidestick to it and locks it up. The pulling or proving of the galleys (which is done at a galley press) is undertaken by the different compositors in rotation, and it is the duty of the compositor who locks up the galley to ascertain "who is in the pull," *i.e.*, whose turn it is to pull it. Two proofs are pulled; one to go to the editor, the other to be retained by the printer.

Every compositor is required, under a penalty for neglect, which is rigorously enforced, to write his name on the piece of copy which he composes. The compositor who pulls the galley has to collect from the hands who have been engaged upon it the different pieces of copy composing the galley, and to arrange them in order. He must be sure that no pieces are missing; if any are not to be found, immediate notice must be given to the overseer.

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He then rolls up the copy inside the proofs (writing his name on the latter, at the bottom, in pencil), and places the bundle in some place near the printer's desk, which has been previously arranged upon, and from whence it will be carried by the reading boy to the closet in order to be read.

The reader not only marks all the errors in the proof that he may discern, but writes on it the names of the different compositors who have set it, indicating exactly where each began and left off. He sends out the proof to the compositor whose name appears first in order, and this compositor does his own corrections and then passes on the proof to the man who is next in order. In this way each man corrects his own matter. If, however, there are only three marks or less, there is "no pass," that is to say, the compositor who has the galley does them, instead of passing it on to the one who set up the matter. The reader meanwhile keeps the several pieces of copy.

When all the galley is corrected, two more proofs called "revises" are pulled: one for the editor, the other for the printer. If the contributor or author also has to read the matter, it involves the pulling of a third revise. To distinguish the revises from first proofs, the reader marks on the head of them in ink the letter R.

The galleys of matter are kept on shelves or in racks, which are generally labelled with the kind of matter that is to be laid down there; whether "home," "foreign," "colonial," &c. This is done in order that the maker-up may know, without searching, where each kind of matter is to be found. On a separate galley are kept all the headlines which stand from week to week, duly arranged in order. The dates are all altered together, as are the folios, before the pages are made up. This is a most important regulation, for there is nothing so easy, and few things more annoying, than to have a wrong line, date, or folio at the head of a page. The galley containing the headlines should be pulled as though it were new matter, and the correctness of the date and the sequence of the folios

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carefully scrutinised. In this way time is saved and danger of mistakes minimised.

When there are many standing lines in a paper, they also may be kept on one galley, specially reserved for that purpose. They should be arranged in proper alphabetical order.

The revises are sent by the reader to the printer, and by him forwarded to the editor or sub-editor. In some offices a bag is provided for the messenger, and there are two keys for it, one being kept by the printer, the other by the editor, or someone authorized by him. The messenger receives the bag locked, and so delivers it to the proper recipient, and returns the bag in a similar condition; and thus all chances of the copy or proofs being tampered with are avoided.

As soon as the editor has returned the revises, and specified the contents of the forthcoming number, "making up" is proceeded with. It is customary for the printer to supply the editor with a statement of the matter composed, showing the titles of the different articles and the space they will occupy, in columns, and eighths, or fourths, and the editor marks on this the articles that he desires to appear; otherwise the return of a proof duly corrected and initialled by the editor is a sufficient authority to the printer to include such matter in the make up. Whatever alterations or corrections are marked in the editor's proofs are done in the metal before the matter is made up into pages. If these marks are very heavy, or involve much overrunning, or include much new matter, it is best to have another revise pulled, and compared with the editor's proof by the reader.

Making up is done by certain selected men who are either very quick at that operation, or have had long experience of the paper and its arrangement. Each page is tied up and taken to the proof-press, where it is pulled in duplicate, the matter being then transferred to the imposing stone. It is usual for the editor or sub-editor to read the pages, and important alterations are sometimes made at this stage. In any case the pages are finally "read

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for press" by the reader. This reading includes both "tracing" and "revising," that is to say, examining that all the different "takes" and galleys are properly made up, and ascertaining that nothing is omitted or misplaced, and also in examining whether all the editor's or author's marks on the galley slips have been duly attended to. The reader further observes whether the head-lines, dates, folios, &c., are correctly placed; and whether there are any glaring blemishes of workmanship, such as wrong division rules, bad spacing between articles and paragraphs, &c. The proofs of the pages are then given to the printer, who has all the marks attended to. The pages are now imposed, locked up, and sent to press. In some offices there is a machine reviser who gives the whole paper a comprehensive "look over" before the impression is actually worked off.

A journal of the kind indicated is, in London, generally printed off on Thursday night or very early on Friday morning, in order that copies may be supplied to the trade about the afternoon of the same day, and that the country dealers may have them by Saturday morning. The hours of working are arranged as follows:—On Monday the compositors are engaged in distributing; getting their cases filled for the work which is to come. If there are any proofs to "go out," that is, to be sent to the authors or editor that evening, the copy is given out and composed, otherwise no copy is taken up this day. On Tuesday the work of composition begins in earnest, and on Wednesday it is continued. On this second day as much as possible is got up, and the men stay an hour or two overtime for that purpose. Thursday is the great day, and that on which the "rush" of work happens. Sometimes only a quarter of an hour is allowed for dinner and the same for tea. The work, of course, goes on until it is finished, and composition is sometimes continued until one or two o'clock on Friday morning. As a rule, however, this is avoided. About tea time on Thursday evening the making up of the pages is begun. This work is done "on time," that is to say, the compositors are not paid at piece prices, but by the hour. The author's and editor's corrections, alterations, &c.,

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are also done on time, as they could not be charged in any other way.

Compositors' Wages Bill.—There are several methods of keeping compositors' accounts adopted in London establishments, but the following are probably as good examples as could be found. When compositors work *altogether* on time, a bill of the form annexed is made out:—

CAXTON PRINTING WORKS.

WAGES BILL.

Department.....

Name..... *No*.....

For the Week ending.....

DAYS.	HOURS.	DESCRIPTION OF TIME.	RATE.	AMOUNT. £	s.	d.
		Regular Time.....				
		Over Time				
		Night Work				
		Lost Time				
			£			

EXAMINED

If the compositor is engaged on several papers, he writes at the back of the bill the time that is to be charged to each. He hands in his bill, or "doc" (document), to the printer, who checks it and forwards it to the counting-house to be paid.

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If, on the other hand, the compositor is "on his lines," that is to say, he is paid by the piece, the following is a good form for a bill:—

Compositor's Name.....

Week ending.....

Folio.	Name of Article.	First Word.	Last Word.	Non.	Min.	Bour.	Time.
2, 3	Shah	In	fty	23			
11	Part	Mr.	cent	14			
17	Money	Money	act	7			
15	Pars	The	19,500	6			
	General	The	income	11			
	Foreign	The	fund	2			
	General	The	town	12			
	Markets			31			
	Punch	A	would	17			
	Court	The	ystdy	5			
	Mk Lane	From	harvest	20			
	Comics	From	mails	11			
	Pars	At	evening	9			
				168			

In order to show how this bill should be calculated, we will suppose that the prices paid in the office are, nonpareil, 4s.; bourgeois, 2s. 6d.; and minion, 3s. 2d. per 100 lines. This will make an ordinary sum in simple proportion, thus for 168 lines nonpareil—

$$\begin{array}{rcrcl} 100 & : & 168 & :: & 4 \text{ shillings} \\ & & 48 & & 12 \\ \hline & & 1344 & & 48 \text{ pence} \\ & & 672 & & \\ \hline 100) & & 80{,}64 & & \\ \hline & & 80 & & \text{which is pence} = 6\text{s. } 8\text{d.} \\ \hline \end{array}$$

In short, it is only necessary to multiply the lines by the number of pence per thousand, and throw off the two last figures. The remaining ones are the value in pence of the

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work. In newspapers, to avoid fractions, if there are 40 ems over, a half-penny is charged; if 60, a penny. A corresponding rate for time to these piece-prices would be 10d. per hour, 5d. per half-hour, 3d. per quarter hour, and 1d. for each five minutes.

To save time, a list is generally printed of the prices of composition by the line, so that instead of turning his matter into thousands, the compositor simply counts the number of lines and charges accordingly. For instance, a newspaper set to a 15 em measure might pay as follows:—

Lines.	Bourgeois.	Brevier.	Minion.	Nonpareil.	Long Primer
	s. *d.*	*s.* *d.*	*s.* *d.*	*s.* *d.*	*s.* *d.*
1	0 0½	0 0½	0 0½	0 0½	0 0½
2	0 0¾	0 0¾	0 0¾	0 1¼	0 0¾
3	0 1	0 1	0 1	0 1¾	0 0¾
4	0 1¼	0 1½	0 1½	0 2¼	0 1¼
5	0 1¾	0 2	0 1¾	0 2¾	0 1½
6	0 2¼	0 2¼	0 2¼	0 3½	0 1¾
7	0 2¾	0 2¾	0 2¾	0 4	0 2¼
8	0 3	0 3¼	0 3	0 4½	0 2¼
9	0 3½	0 3¾	0 3½	0 5¼	0 2¾
10	0 3¾	0 4	0 3¾	0 5¾	0 3¾
20	0 7½	0 8	0 7½	0 11½	0 6
30	0 11¼	1 0	0 11	1 5¼	0 9¾
40	1 2	1 4	1 3	1 11¾	1 1
50	1 6¾	1 8	1 6¾	2 5¼	1 4½

The manner of setting ordinary newspaper matter has been already described, and further explanation is unnecessary. The principal qualifications of a newspaper hand are his ability to set with great rapidity and at the same time with due correctness. A slow or a "dirty," that is, incorrect, compositor is altogether out of place on a newspaper, and indeed seldom retains a situation of that kind. Next to these qualifications come the facility with which he is able to read hastily-written and intricate copy—a gift which partly arises from natural aptitude, and partly from experience. The newspaper hand is also expected to be well acquainted with the contents of the current

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journals, and to know how to spell readily the proper names most commonly found in them.

Advertisements.—In some newspaper offices the advertisements are set up by a separate staff of compositors, who work independently of the others, and supply the advertisement pages, ready corrected and tied up, just in time to be incorporated in the forme when it is made up.

Advertisements are composed in two different styles, known as "run on" and "displayed." A *run-on* advertisement is set like a common paragraph, except that it is begun with a two-line letter, and that the first line is set up in a larger type than the body, and this line is in capitals. Other parts, to which particular attention is desired, are also set up in capitals. In regard to this kind of advertisement no special instructions are needed. The compositor must remember that capitals must always follow the two-line letter; as—

JOSEPH M. POWELL, Publisher of the *Printers' Register*, London, E.C.

If the first words are abbreviated to their initials, some newspaper offices insert each of them in two-line letters:—

J. M. POWELL, Publisher of the *Printers' Register*, London, E.C.

In other offices this would be set up in the manner following:—

J. M. POWELL, Publisher of the *Printers' Register*, London, E.C.

It is the duty of the compositor to ascertain which of these styles is adopted in the particular office that he is working in, and follow it.

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The second line of such an advertisement is always indented *one em*.

Advertisements of another class are thus known as the *displayed*, but directions for setting them will be found under the section of "jobbing," to which they more properly belong, as they generally involve the use of different founts, and require considerable taste and some special experience.

CHAPTER XXII.

TABLE WORK—Definition—Distinction between Table Matter, Column Matter, and Common Matter—Cutting the Rules—Methods of Working—Examples—General Hints.

FIGURES and words arranged in parallel columns, separated from each other by rules, form *tables*. Tables differ from common matter in the measure being sub-divided, and various portions of the line requiring to be separately justified.

It has been found necessary, however, to make a stricter definition than the preceding of what table work consists, and of what constitutes the distinction between it and common matter. In the Scale of Prices of the London Compositors' Union for compositors' work, there is defined, besides common matter, *Column matter*, and *Table matter*, or "tabular and table work."

Column matter is matter made up continuously in two or more columns not dependent upon each other for their arrangement.

Table Work is matter set up in three or more columns, depending on each other, and reading across the page. It is paid in London as follows:—

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3 columns without headings ... one fourth extra.

3 columns with headings or 4 columns without headings } one-half extra.

4 columns with headings and 5 or more with or without } double the price of common matter.

The setting up of Tables is one of the most intricate departments of the compositor's work. It requires calculation, accuracy, and taste, and the exercise of a considerable amount of patience. If every line be not properly justified, the matter is nearly sure to be loose, and letters will drop out when it comes to be lifted; and even if "botched-up," then the roller will probably draw out some of the figures in printing, the absence of those figures perhaps rendering the whole table useless to the reader.

The one principle that runs throughout the whole art of table setting is to regard each portion of a line separated by a rule, as a line; to set the stick to that measure, and to justify the matter as if it were a complete line.

The first thing to do, then, is to decide upon the length of these fractional lines. When the copy of a table is given into the hands of a compositor, he is usually told how much the table is to make, or what space it is to cover. It may require to be got into a page of a book, or a column of a newspaper, or a small card. It is the compositor's duty to do this, if possible, and to exhaust every method for accomplishing it. Experience will often tell him at a glance that the thing cannot be done in some specified type. He must then try it in a smaller type. If in book or newswork, the table may be sometimes divided into two parts; or it may extend over more than a page or column. In the latter case the sanction of the employer or overseer will, of course, be necessary before this can be resorted to. The compositor ought to be able to say with certainty how much the whole will make, and to know, approximately at least, the smallest space into which the matter can be got.

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A TABLE

Showing the number of Sheets of Paper required for different jobs, when more than one copy is got out of a sheet. The column "o" shows the overplus copies to the stated quantity of paper when the sheets produce more than the exact number required.

Number of Copies	NUMBER OF IMPRESSIONS ON SHEET.																								Number of Copies
	1		2		3			4			6			8			9			12			16			18			
	Q.	S.	Q.	S.	Q.	S.	O.	Q.	S.	O.	Q.	S.	O.	Q.	S.	O.	Q.	S.	O.	Q.	S.	O.	Q.	S.	O.	Q.	S.	O.	
50	2	2	1	1	0	17	1	0	13	2	0	9	4	0	7	6	0	6	4	0	5	10	0	4	14	0	3	4	50
100	4	4	2	2	1	10	2	1	1	...	0	17	2	0	13	4	0	12	8	0	9	8	0	7	12	0	6	8	100
150	6	6	3	3	2	2	...	1	14	2	1	1	...	0	19	2	0	17	3	0	13	6	0	10	10	0	9	12	150
200	8	8	4	4	2	19	1	2	2	...	1	10	4	1	1	...	0	23	7	0	17	4	0	13	8	0	12	16	200
250	10	10	5	5	3	12	2	2	15	2	1	18	2	1	8	6	1	4	2	0	21	2	0	16	6	0	14	2	250
300	12	12	6	6	4	4	...	3	3	...	2	2	...	1	14	4	1	10	6	1	1	...	0	19	4	0	17	6	300
400	16	16	8	8	5	14	2	4	4	...	2	19	2	2	2	...	1	21	5	1	10	8	1	1	...	0	23	14	400
500	20	20	10	10	6	23	1	5	5	...	3	12	4	2	15	4	2	8	4	1	18	4	1	8	12	1	4	4	500
750	31	6	15	15	10	10	...	7	20	2	5	5	...	3	22	2	3	12	6	2	15	6	1	23	2	1	18	6	750
1000	41	16	20	20	13	22	2	10	10	...	6	23	2	5	5	...	4	16	8	3	12	8	2	15	8	2	8	8	1000
1500	62	12	31	6	20	20	...	15	15	...	10	10	...	7	20	4	6	23	3	5	5	...	3	22	4	3	12	12	1500
2000	83	8	41	16	27	19	1	20	20	...	13	22	4	10	10	...	9	7	7	6	23	4	5	5	...	4	16	16	2000
3000	125	0	62	12	41	16	...	31	6	...	20	20	...	15	15	...	13	22	6	10	10	...	7	20	8	6	23	6	3000
4000	166	16	83	8	55	14	2	41	16	...	27	19	2	20	20	...	18	13	5	13	22	8	10	10	...	9	7	14	4000
5000	208	8	104	4	69	11	1	52	2	...	34	18	4	26	1	...	23	4	4	17	9	4	13	1	8	11	14	4	5000

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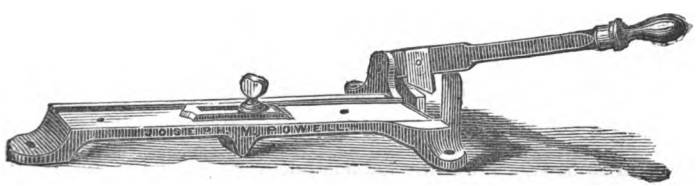
If the copy is reprint, and has to be set up in the same sized type, the work will be very considerably simplified, and it is this sort of copy that should be given to the young compositor, when he begins to set up tables. We may illustrate the subject by referring to the preceding table, which is otherwise useful in the printing office.

The body of this table is set up, as will be seen, in Brevier. The compositor must begin by getting together a proper supply of the sorts of types he will most likely want, as well as the en, em, and other quads, rules, &c.

In a case like this, he may use ready cut or "case rules," or he may cut the rules for himself. Generally speaking, it is always best to use ready cut, or what the Americans properly call "labour-saving" rules, for they not only economise time and trouble, but avoid a great deal of waste of material. If they could be made available in all jobs, it would be very advantageous to the employer, and convenient to the workman; but unfortunately they cannot: and it becomes the duty of the compositor to know how to cut up rule properly.

Rules may be cut with a pair of scissors or shears, or with a proper rule cutter. If shears are used, great nicety is required to get the rules, especially if small, to the proper size. In cutting a thick rule, let the lower arm of the shears rest firmly upon something, and the work will be facilitated. This is a little fact which many persons seem to be unaware of.

There are several kinds of rule cutters, each of them being adapted also for cutting leads. One is called the "ordinary lever cutter," and its construction will be understood from the following diagram:—



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Another is called the "Gem rule cutter," and is specially adapted for cutting easily, and with the least possible burr. A spring, connected with the handle, enables it to recover itself after being pressed down to sever the rule. The slide is fixed at any point by a finger-screw.

If the rule cutter is employed, it is only necessary to slide the gauge along and to fasten it at the proper place, to ensure the rule being cut to the exact length required. Make up the gauge very accurately with pica or nonpareil quadrats if possible. Endeavour always to keep your column matter to even measures of some body, or to even fractions of it. The rules may then, perhaps, be used for another job without cutting, or metal rules or space rules of the proper size may be available. Bring down the handle and the knife with a sharp, steady action, increasing the speed as the knife falls; steadying the rule to be cut with the fingers of the left hand, being careful, of course, to keep them out of the way of the knife.

If very small pieces of rule are required, they may easily be cut, with a little management. Suppose you want a 2-em brevier rule. Take a few odd pieces of rule that are of no uniform length, and cut them, say, to 12-em pica length. Then, without moving the slide of the cutter, place two brevier ems against it and re-cut the rules. The pieces cut off are the required size. Next re-set the cutter to the size of the shortened rules, replace the two ems, cut as before, and so continue until the rules become too short to be held in place; or let the slide remain unmoved and add a 2-em quadrat as often as required.

Rules that are cut with scissors always get more or less bent, and require to be straightened by being beaten on an imposing surface. This must be carefully done or they will be permanently injured.* Those that are cut with a proper rule cutter are not so bent, but they always have a roughness or burr—however good the rule cutter is—on the edge that has been cut. The compositor who wants to do nice work will take pains to remove this burr. He

* The best way to straighten bent rule is to put a smooth quoin on it, and to strike the quoin with a sheepsfoot or mallet.

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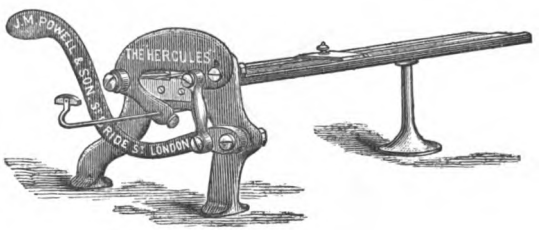
may rub it off on a stone, which, if done very carefully, is efficacious; but a better plan is the following:—Get two files, both fine ones, but one large and one small. Let these be the compositor's own property, and their use "non-transferable" to anyone else. The small file should be one such as a watchmaker uses. The large file is to be used first, and it will take away the burr.

A third, and perhaps the best kind of rule cutter is called the "Hercules."



The great power of this appliance is derived from a judicious combination of levers. It cuts rule, without turning the face, perfectly square, and has a separate knife for rule and leads, each capable of the surest adjustment. The power is so great that it easily cuts through brevier column rules. Special gauges admit of instantaneous adjustment for leads and rules at the same time, without removing the screw. There is also a front gauge.

Besides causing the burr, the ordinary rule cutter makes a bend or deflection in the face of the rule, or the fine edge which makes the printed line. Lay this deflected or turned edge of the rule on the first or index finger of the left hand, holding the rule with the thumb and fingers, and, keeping the file parallel with the rule, pass it carefully over the corner. The turned portion of the rule can thus be taken off without perceptible injury to the face.

Any kind of small rule can be made in an ordinary rule cutter with a little contrivance. First of all, put in a piece of lead of any convenient length, say 12-ems pica; then put in quads or en quads, spaces, &c., to the length

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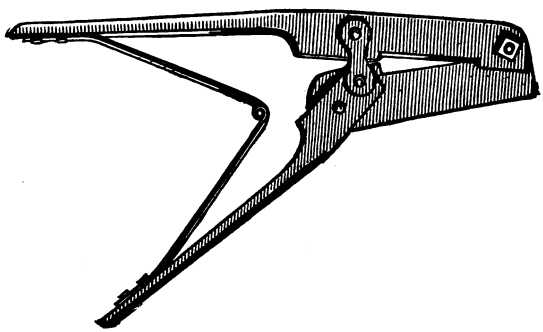
to which the rule is to be cut. Then fix the gauge and remove the quads, &c., and substitute for them the rule to be cut up, leaving in the lead, which enables the finger to hold the small piece while it is being cut.

Improved Brass Rule Shears.—These shears are a great improvement on the old style. They cut rule almost as easily as card can be cut with ordinary shears—can be



kept in the pocket, being not much larger than a pair of scissors. They are made with a gauge and clamps for attaching to a lower-case. The shears thus form a small but powerful rule cutter.

We will now apply ourselves to the table to be composed. In a case of this kind it is often best to leave the setting up of the head undone till after the body of the table is finished. We begin with the "number of copies" column. Running the eye down the column, we see that the maximum number of figures in it is four, and as every figure is an even en, the width of this column must be four ens, or two ems. Make up a stick to this measure, and set each line, going regularly down the column. Before the 50 an em quad will be required, before the 100 only an en quad, and after 750 no indentation whatever is necessary. Put up a galley on the case, and carefully empty each stickful on to it. Measure the length of t'.e rule wanted, and put one in. The line "number of copies" need not be set up now, for it can be varied in length, as circum-

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stances require, afterwards. Next set the column beginning 2 2. The last line shows the maximum space that will be wanted; that is, 3 ens (for figures) + one en quad (dividing the two denominations, quires and sheets) + an en quad + one en (for the figure) total 6 ens = 3 ems. This will be the measure of the next column, which must be set up exactly in the same way as the first was. The succeeding columns must be treated in similar manner. If space will permit, the table will be improved in appearance by placing an en quad down each side of the columns, to bear off the rule, as is shown by the two end columns, "Number of Copies."

A stick need not be made up for the different measures in the headings. We know that 2 ems is the width of the first column, and it is equal to two lines of the type. The q. and s. headings may be set up and justified against quads, with the fingers. The large figures may be justified in the same way.

The preceding exemplifies the method of setting table work generally, but its application to different cases often involves a large amount of trouble and manœuvring. A few hints may be given for adoption in certain emergencies.

If you have a very narrow measure to set, place a 2-em or 3-em pica quadrat in the stick, and make it up to that, plus the measure to be set. You may thus much more conveniently set up a short line; of course removing the pica quad before lifting out the matter.

Frequently, the heading determines the width of the column. Hence it is necessary to examine the headings before deciding upon the measure of the column, and if there is anything peculiar in them, or if they are very heavy and the column light, set them up first.

If a number of lines succeeding each other are indented by or followed by an em quad, it is best to use, not single em quads for each line, but 3 or 4-em quads placed sideways, and serving for as many lines. These make the table stronger; indeed, as a general rule, in

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table work, as in all composition, use as few pieces as possible.*

Whenever practicable, get the columns of equal breadth. Similar measures give symmetry to the work, even although the matter in the columns does not always quite fill them up.

Headings are generally set in type two sizes smaller than the body of the table; but if the body is nonpareil or less, the heading may be in the same type.

At the bottom of each column, endeavour to get in a quad to the full measure, or if more than 4-em, put in as large pieces as possible. This strengthens the column. If there is not room for quads, cut a lead to the size and insert that as a stay.

Never mix the founts in the body of a table, if it can be at all avoided. If the table is in brevier, use brevier throughout, even if minion or other spaces now and then would apparently give less trouble in justifying.

If headings are wanted to be used again for new sets of tables, it is best to compose them so that they are complete in themselves, and can be lifted away from the matter without interfering with it. In the example given, a rule the full width of the table might be used under the line containing the Q. S. and the column rules cut accordingly. But it is the neatest plan to make all the upright rules of one piece, and to make the cross or transverse lines composite.

Especial care should be taken by the compositor that his rules are the exact length required. If any of them are too long, and extend beyond the matter, they will "bind" it, and cause the column to be loose, as the rule and not the types will get the force of the locking up.

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* One exception is, to avoid a hair space; it is better to put a middle space, thick space, and an en quad at the end of a line, than an em quad and a hair space.

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If not evenly cut, the rules also may bind at one portion; but this cannot happen if a rule cutter in proper order is used.

The width of the columns must be very exactly cast off. Any error in this calculation may prevent the table corresponding with the copy, or may make it too large or too small for the space required to be filled.

Calculate the width of the columns in ems of the type of which the body of the table is to be set. If this be done the small cross rules can be set in *metal rules* of the same fount, if they are not very long. Brass rules, however, look much neater, and do not give much more trouble.

In estimating the width, the comma may be reckoned as an en, and a middle space will make up the difference.

Where possible, allow some space between the rules and the columns of matter, an en or an em space according to circumstances. Endeavour especially to leave some white at the top and bottom of the column; a space equal to an en is the usual quantity.

Each column heading should be placed in the middle, in respect to that column, and the last line (if the heading is in more than one line) should have a white line after it and before the rule.

Some good printers adopt the plan of inserting no full points whatever in headings, except when words are abbreviated. They urge that words so used do not form sentences, and therefore need no grammatical points.

The heading may run up the column or across it, as seen in the table on a following page, "Reader's Return."

In imposing tables, the rule is as follows:—If they run the whole length of the page and are placed broadwise, they begin from the outer margin; if on the left-hand page, and the inner margin if on the right page, so that the folio of the page is to the right hand of the reader.

In setting money columns, place an em quadrat between

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all single figures, and an en quadrat before double figures; thus— 1 5 11 The next line will then range properly, as—2 17 6

Before beginning to set money or other columns, notice whether there are farthings or fractions at the end of any of the lines. If there are, the lines must not extend to the end, but an en quad must be inserted to allow of the fractions.

On the following page is a "blank table," with a heading which will show the system referred to in some of the preceding paragraphs more distinctly. It is a very useful heading for a book intended to keep an account of a reader's work, and therefore here serves a double purpose:—

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READER'S RETURN.

DATE.	TITLE OF WORK.	Sig.	Comp. per Signature.	Time Reading.	Time Revising.	Time Re-Revising.	Total.	Time Revising Author's Proof	Time Revising Author's Revises.	Total Time.	REMARKS.

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The following heading is another example of table work. It is a plan for a book intended to register the names of subscribers to a periodical, and to keep an account of the copies supplied to them:—

SUBSCRIBERS TO THE

NAME.	ADDRESS.	WHEN SUBSCRIPTION RECEIVED.

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PRINTERS' REGISTER.

NUMBERS SUBSCRIPTION COVERS.	NUMBERS SENT.												REMARKS.
	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	

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We may conclude this chapter with an account of a method of setting tabular or column matter which was recommended by the late T. S. Houghton, of Preston, an ingenious practical printer, and which he regarded as a great improvement on all other plans. We do not entirely share his views as to the universal applicability of the system, or admit the economy which he says invariably attends its use. Further, the plan of justifying to a gauge, such as a lead or a rule, is a somewhat dangerous one; and columns so made up can hardly be expected to be as accurate as those set up in a stick and justified like any other line. The trouble of altering the gauges should also be taken into account.

The principal feature of this system is that the whole of the line, across the page, is set up as if it were common matter. The columns are, in the first place, set to certain lengths, allowance being made for the rule. Thus, if in a table there were one column 10 ems wide—one 9, one 8, and one 7, it would be set thus:—

The stick would be made up to the total of the column widths; viz., 34 ems plus 3 rules of the thickness intended to be used. The 10-em column portion would be set first, and it would be justified by filling up the remainder of the line with a thick rule or lead, 24 ems long. Then this rule would be removed, and the next column portion would be set and justified against a rule 15 ems wide. The next portion would be justified against a rule 7 ems wide. The space left would be 7 ems, and this would make the last portion, and justify the line completely.

The down rules, Houghton advises, should be put in after the matter has been proved and corrected, as "it is much easier to correct it in this state than with the rules in their proper places, especially should there happen to be 'outs;' as any line may now be taken out, additions or alterations made in any column, and the line replaced without interfering with any other." The manner of inserting the rules is thus described:—"This is done easily by turning the galley with its head next the body [of the compositor] and insinuating between each column

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at the head the point of a bodkin, the left hand holding steadily the bottom of the column to be opened. The columns are thus moved, and the rules inserted, as soon as so many leads could be in ordinary matter."

CHAPTER XXIII.

BOOK WORK ARRANGEMENTS AND COMPANIONSHIPS—The Clicking System: Its Advantages and Defects.

IN order to secure uniformity in the appearance of the work, and expedition in its execution, it is usual, in the large London offices, to form the hands into companionships, or small bodies of men, with a leader at the head of each, competent to take general orders from the overseer and to secure their being properly carried out in practice. Those, too, who constitute the companionship are trained to work together, and the capabilities of each individual are also more particularly ascertained than if he were not subjected to such close supervision as the companionship system secures.

The chief of the companionship, or "ship," as the word is generally abbreviated, receives the copies from the overseer or the "closet" * for all the men associated with him, and makes up the general bill, writing his name in the "bill book" as "J. Smith & Co." (for companions).

There are two ways of conducting a "ship." In one of them each compositor makes up his own matter, and charges for it independently of his fellow-workmen; while in the other the making up is performed by one man only, called the "clicker," who may, however, call in assistance. In the latter kind of companionship, the members of it merely compose and correct their own matter. We will describe both systems, beginning with the first, which is a much more old-fashioned one than the second, but still has its supporters.

* In the language of the printing office, "the Closet" is understood to mean either one of the firm or the overseer; just as in political matters certain of her Majesty's Ministers are known as forming "the Cabinet."

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When the work is given out, A, the first who has copy, sets the whole of his take, and "passes the make-up" to B, the second in copy. The pass book is a book used for recording the number of lines taken and lent in making up. A, for instance, may have borrowed from B some matter to complete the last page, or have more matter than he wants to make up a page, and may transfer that to B. The pass book is kept as follows, if A has borrowed ten lines:—

Compositors' Names.	*Title of Work.*
Jones to Brown.	Practical Printing.

Folio 7—7th in B.
Running head: PRACTICAL PRINTING.

OWES	OWING TO
A ..... 10 lines	B..... 10 lines

A also gives B the gauge of the pages. B then sets the whole of his copy, notes as well as text. The portion of copy, it may be here stated, that is allotted to a man must always be completely composed before he asks for more. B now begins, without delay, to make up. We will suppose he has had to borrow 5 lines from C, who follows him. B, when he has done, passes the book in the following form:—

B to C. Practical Printing.
Folio 12—12th in B.
Head: COMPANIONSHIPS.

OWES	OWING TO
A..... 10	B 5
	C 5

C passes the making up to D, and probably borrows 12 lines from D, when the book will stand as follows:—

C to D. Practical Printing.
Folio 21—5th in C.
Head: THE CLICKING SYSTEM.

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Owes		Owing to	
A.....	10	B.....	5
C.....	7	D.....	12
	17		17

The first form shows that on passing the first making up, there are 10 lines due to B. When, however, B passes the making up, he diminishes the debt due to him by borrowing 5 lines, and the name of the creditor C appears in the second column for 5 lines. When C passes the making up he not only pays himself these 5 lines, but becomes a debtor to the amount of 7 lines. His name is therefore transferred to the first column, and the number of lines he owes is placed against his name. Should D pass the making up to A and take 14 lines, the following will be the form of the table:—

D to A Practical Printing.
Folio 33—1st in D.
Head, as before.

Owes		Owing to	
C.....	7	A.....	4
D.....	2	B.....	5
	9		9

The total of the lines owed and owing must, as will be seen, always correspond. No misunderstanding or error will occur if this rule is uniformly observed.

When the first sheet is out, A and B impose; the second is imposed by C and D, the third by E and F, the fourth by G and H. When there is a return of letter, the formes are laid up by those whose turn it is to impose.* If the letter for distribution be equally shared, the quantity composed by each companion will be nearly uniform. When this principle has been carried out it has been found at the end of a large volume that the difference

* See form for recording this part of the work, page 232, also compositor's cheque-book, page 233.

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between the quantity composed and imposed by each companion has not varied either way more than a few pages. The system also tends to prevent disputes, and to facilitate the getting out of work. If any derangement arises in the account of transfer of lines, it is best to pay off the lines appearing in the book and commence the account afresh.

In this system also, the compositor having to make up his own pages is more likely to acquire a thorough knowledge of this branch of the business than under the plan next to be described; but the latter is probably more expeditious, as it saves the time lost in passing the make-up.

The Clickership System.—The overseer hands the copy to the clicker, and gives him directions as to the general style of the work, perhaps a specimen sheet * of another work, or a specimen page. He also instructs him as to when the sheets are wanted to be sent out. The clicker then calls the members of his 'ship together, and communicates such general directions as may be necessary. He also informs them what cases to put up, and what letter is to be distributed. In some offices the overseer selects the clicker; in others he selects the men, and they select their clicker, according as to whom they think best qualified for the position. Having done this, they proceed with the distribution of their letter. The clicker, at the same time, gets from the storekeeper the necessary materials, such as leads and sorts, and everything, in fact, that he wants for the making up. He then provides himself with a rough book of blank paper,† which he rules according to the form shown on the following page.

In the first column is set down the name of each compositor, as he takes copy; in the second, the folios of the

* Most publishers require a specimen page of new works to be set up and submitted to them before the composition is given out. This is returned to the printing office, and forms a guide for the clicker in regard to the style to be followed.

† We do not know why books ruled in the manner shown are not supplied to the clickers, especially as the form is the same in every office, and for all kinds of works. It seems to be an institution of the trade that the book should be of blank paper with a rough brown paper back, and that the clicker should waste time in ruling every page.

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copy, so that the clicker may be able to ascertain instantly in whose hands any particular piece of copy may be. In the third column he notes down, opposite to his name, the number of lines each man has composed, as fast as the galleys are brought to him. In the fourth he sets down such remarks concerning the copy as may be necessary; also any incident that requires to be recorded in regard to the progress of the composition, or any circumstances concerning the companionship.

Compositors' Names.	Folios of Copy.	Lines Composed	Remarks.

The clicker gives out, as the first take of copy, but a small portion, and the first two or three compositors get less than those that follow. This is to prevent any delay in the make up; for those who have the shortest takes, of course, get them finished first, and in this way they are enabled to "empty" in regular order.

During the time the first take is in hand the clicker will employ himself in setting the half-head, head lines, folios, white lines, signatures, side notes, poetry, and other incidental matter. He proceeds, however, with the making up as soon as a sufficient quantity is composed. He knows when the first takes are finished, by the compositors applying for more copy. As he receives each man's galley, he counts the lines, and enters the number against the compositor's name, in the book already referred

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to, this entry serving as a check against the man's bill when he presents it at the end of the week.

When the first sheet is made up, the clicker lays the pages on the stone, and then informs the "quoin drawer overseer," * or the person whose duty it is to provide him with chases, furniture, &c.

The clicker now proceeds to lock up the forme. He takes off the cords of the pages, puts in the furniture, side and foot sticks, and quoins, and locks up the forme. He then takes it or sends it to the proof puller; or if there is no special proof puller he pulls the proofs himself. The copy should be given to the proof puller in regular order, with a direction as to how many proofs are to be pulled, and the latter places the proofs, properly folded, with the copy, in the closet or in the place set apart for them. It is a good plan to have a series of pigeon holes in the closet, or a few paper weights, labelled: "First proofs," "For revision," "For press," &c., and to keep the copy and corrected proofs under each designation, and separate from any other. In some offices all the proofs, revises, &c., are kept on lines, being placed there by the proof puller. They are thus always under the eye of the overseer, who knows at once what work is waiting for the readers.

In this way the compositors are kept continuously engaged at their cases, while the clicker is free to attend to the incidental matters that arise, and which are done more systematically and expeditiously by one man than if each of the companions had to do a portion by himself. As soon as the work is begun, if there is a sufficient supply of leads, sorts, &c., direct progress can be made, without waiting for anything, or one man delaying another.

Sometimes, especially when there is an unusual quantity of notes, poetry, or other "fat," which in the ordinary course the clicker ought to set, he finds that he must have assis-

* The quoin drawer overseer is usually a compositor who is entrusted with the charge of the furniture, chases, and other material of the kind kept in the composing room. He is distinct from the storekeeper, who keeps the types, sorts, &c. The exact relative duties of the two are not, however, very strictly defined.

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tance, or he will not be able to impose as fast as the matter is set up. In this case he calls to his aid one of the companions to do this kind of setting. If this companion has not finished his take, the compositor next to him in copy sets it up, right on to where he himself begins; or, if there is a great deal to set, the man who took copy last finishes it for him. This assistant compositor is credited with the lines he has already set, and is remunerated for the other part of his work by being credited with a certain number of hours—that is, with hours he is engaged "on time."

The reader corrects the proofs and forwards them to the clicker, who orders the compositor whose name appears first in the sheet to "lay up the forme" and correct his matter.* The proof is passed regularly on from one compositor to the other, until each has corrected his own matter, and the entire forme is finished. The last person who corrects, locks up the forme, and takes it to the proof press, along with the first or foul proof. The compositors are never taken from their frames, except to correct their matter, which, as we have already pointed out, saves a great deal of time, but, on the other hand, tends to make them into mere "line setters;" and give them no opportunity of completely learning the business.†

When the last taking of copy is given out, the clicker is expected to apply to "the closet" or the overseer for more work, so as to prevent his men standing idle. Very often,

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* The clicker or his assistant usually corrects the errors in the headings, notes, or those portions which have been set up on time.

† It is one of the disadvantages of a large office, as far as the compositors are concerned, that a person may remain a member of a companionship and be kept from the third or fourth year of his apprenticeship up to the close of his career as a compositor, merely setting up and distributing lines of type. He remains entirely in ignorance of the methods of making up, making margin, or imposing, as he is never called upon to perform them, and even the display parts of the composition, the mode of setting poetry, and many other things, are kept from him. Many men so situated are not able to pull a proof, and it cannot be wondered at if they find their trade such a monotonous one, and constantly deplore the fate which brought them into it. It is, indeed, this class of persons who, perhaps not unreasonably, are heard complaining of the business and comparing it so unfavourably with others. It is also this class of persons who despise technical handbooks and opportunities of learning anything more than they know. So that they can "pull out" a sufficient number of lines to make a decent bill at the end of the week they are quite satisfied.

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however, one companionship, with one clicker, will have three or four works going on at the same time, so that if there is a scanty supply of copy or of letter for one work, the clicker employs the companions on another. If the work is nearly finished, and there is no more copy to be given out, then the lines in the entire work are counted off and set down in the book, and each does what he can for the general benefit till the formes are ready.*

Let us see how the clicker and his companions are paid for their work. At the end of the week† the clicker makes out his bill in the following manner. He first ascertains, by counting the lines, what amount of work has been done during the week. He then counts up how many lines each compositor has set, and estimates the number of "hours" they represent. An hour is supposed to be equal to a thousand letters; so that the bill is not made up for so many thousand, but at so many "hours."‡ Having done this, he refers to his book to see how many hours of timework proper have been charged, adding his own time, which is fifty-four for the week, and in addition any overtime he may have worked. He adds all together, and the total is the full number of hours to be paid for out of the bill. By reducing the sum total of the bill into pence, and dividing it by the number of hours, he gets at the price per hour which the bill pays. In other words,

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* In some offices the foolish practice called "cutting the line" prevails. When one of the companions is out of copy or letter, the whole of them are expected to "cut the line," that is, to leave off work when the man so situated has finished his line, and to stand idle till a fresh supply of copy or letter arrives. This often happens near the end of a volume, and seriously interferes with the arrangements of the office. It is also detrimental to the men's own interests, for there is no reason why if one man is short of work all his companions should place themselves in the same unfortunate position.

† In offices where wages are paid on Saturday, the bills are usually made up to Thursday night, and delivered to the overseer on Friday morning. In those that pay wages on Friday, which include the largest and best managed offices in the metropolis, the bill-making is done a day earlier.

‡ In other words, to find the number of hours, ascertain how many ens there are in a line. Then divide 1000 by that number; thus, if there are 50 ens in the line,

$$1000 \div 50 = 20$$

and 20 will be the number of lines to the hour. Sometimes, to compensate for extra trouble involved, owing to the peculiarities of copy, &c., a line or two is given; or a line may be deducted. This is a matter for arrangement with the clicker.

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the entire value of the work, if each man set his own matter and had his own fat, is estimated, and this sum divided by the number of hours. In this clicking system, therefore, the fat, such as the title, blanks, short pages, folios, whites and head lines, cuts, &c., are all made up by the clicker and thrown into the general bill. Hence, each man gets his fair proportion of it when the bill is made out.* The mode of charging for compositors' work will be described hereafter. The result of this system is often to cause disputes and dissatisfaction, and it always occupies a great deal of time in a very unseemly manner. In the clicking system the man who sets up the most lines in the cleanest manner gets, as he ought, the largest portion of the fat.

In some offices, however, there are slightly different methods adopted for paying the clicker; although the men are always paid in the way described. Sometimes the clicker is only paid for the time he is actually engaged on the work. Sometimes the fat is divided equally, and not proportionately to their work, among all the men engaged.

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* In the system before described, the fat is distributed by "jeffing," or "throwing quads." The compositors gather round the stone, and throw for the fat, tables, &c. The following is an account of the method, taken from Southward's "Dictionary of Typography," 2nd edition, p. 58:—"The plan adopted is to take nine em quads—long primer being mostly chosen; these are laid on the imposing surface for the inspection of the whole of the party interested in the matter at issue. One of them takes up the quads, shakes them up between his two closed hands and throws them on the imposing surface, after the manner of throwing dice, when the number of quads with the nicks appearing uppermost are counted, each person having three throws (raffle-fashion), the highest thrower being the winner, or taking his choice of any 'fat.' This performance is not so much in vogue now as it was years ago, before the 'clicking' system came up; then it used to be of daily occurrence in the composing-room, when the title, index, blanks, tables, &c., of a work were given in hand, for the compositors to throw who should have the best choice of the 'fat.' The title-sheet was divided into lots, say: 1, title and blank; 2, preface; 3, dedication and blank; and so on, according to the prefatory matter introduced into the work. Words of Greek, for which one shilling per sheet is charged, were also 'thrown for;' but the clicking system does away with all that, by making a general bill; so that each of the companionship comes in for a proportionate share of 'fat' as well as 'lean.' There are some technicalities connected with 'throwing,' viz.:—if when the quads alight on the 'stone,' one should ride on the other, it is called a 'cock,' and the thrower has to pitch them up again; if no nicks turn up it is called a 'miss,'—and by some loving swains it is called a 'Mary' or a 'Susan,'—and counts for nothing. The average winning throw is seven, and is termed 'the witch.' Nine is considered an excellent throw, and is very rarely exceeded. On very rare occasions, however, three blanks have been thrown, or three nines have made their appearance consecutively by the same thrower, but this is very exceptional."

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In others the clicker charges the same number of hours as the man who has earned the most. This latter plan, however, is bad on principle, for it affords ground for dishonesty. A clicker may give the best and fattest copy to the quickest compositor, and thus enhance his own bill.

There is also a system of organizing three classes of companionships. The first-class companionships have all the best kind of work, and are paid sevenpence or eightpence per hour. The second class take the medium work, and are paid sixpence per hour. The third and lowest class get all the inferior work, for which they are paid fivepence per hour.* In such cases the men are not paid for the fat, which is claimed by the employers as remuneration for the clicker's labour. A new man is generally put in the third-class companionship. If he is a quick and clean workman he is advanced to the second class, and, if he deserves it, he is ultimately removed to the first class. The first class is kept constantly engaged; if there is a scarcity of work some is taken from the second class.

Considered as a whole, the plan of permitting the compositors to choose their own clicker is probably the best and most equitable one. If he does not work to their satisfaction they can, and probably soon will, replace him. As he is paid out of the general bill, the employer knows that he is only paying what the work is really worth, and at the same time the men are getting on with it as quickly as possible, for their own sake, if not for his.

The clicker makes out his bill in a book called the "bill book," which specifies the full amount of the work done and the proportion belonging to each man. On the appointed morning this book is passed round the office, and the clickers fill it up according to the work done in their companionships, signing at foot "[Name] and Co." The amounts payable to each man are transferred from this

* This plan is not practicable in what are called "fair" offices, or those which conform to the regulations of the London Society of Compositors.

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to the general wages list of the office,* if not paid by the clicker.

If all the work done during the week cannot be exactly cast up, the clicker is allowed in some offices to write an "account line," being the estimated value of the work done, but not charged. It is deducted when the final bill for the entire book or job is made out. Sometimes (too frequently, in fact) clickers overdraw their account, and the amount has to be made up in a following week. The work done on this account is called "dead horse." Many clickers involve themselves in much trouble, and cause much loss to their employers, by habitually overdrawing their account.

If one or two men leave the companionship, the rest have to pay more than their share. Sometimes, too, when there is a change of clickers, the outgoing one leaves as a legacy to his successor a heavy "account line," and the liquidation of this has in several instances led to litigation.

Imposing and Distributing Letter.—When all the compositors in a ship are called upon to take a share of imposing, as described in the first of these companionship systems, there are sometimes disputes as to the laying up of the forme for distributing; the rule being that the person who imposes must lay up a forme. It is best, therefore, to keep an exact account of the different pages, in the form given on the next page.

This scale should always be kept by the compositor who is in the making-up, who, when he gives it away to the person that follows him, marks down the number of pages he has made up opposite to the proper signature, and under his

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* It is common to say, "How much do you write?" not "How much do you charge?" The bill book is, in well-managed offices, carefully examined by the overseer to ascertain the diligence or the capability of the different men. If they write a very small bill (provided there is plenty of work in the office), the fact is attributable either to their having lost time in coming late, going away early, standing idle, &c., or owing to their inability to work more expeditiously. As a rule, employers do not like small bills; they had rather have a smaller staff and the members of it receive higher wages. The progress or diligence of apprentices is also gauged by the amount of the bills they write.

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own name; also, when he imposes, he inserts his name in the columns appropriated for that purpose.*

IMPOSITION SCALE.

Signatures.	Compositors' Names.							By whom Imposed.
	A	B	C	D	E	F	G	
A								
B								
C								
D								
E								
F								
&c.								

The plan of a check book, given on the next page, is intended for the compositor's private use. It is supplementary to, and not in substitution of, the preceding plan, which latter, indeed, is for the use of all the companionship in common.

* The usual plan is for the compositor who imposes to enter the respective number of pages in the imposition scale, as sometimes one man may have two takes in the same sheet, which would cause a second entry or an alteration. As a rule, the compositor who has most pages in the first sheet is the one to impose it, and he who has the largest number on the scale in the subsequent sheet imposes it, and so on; but some prefer that all the companions on the work should draw a figure for the first imposition, and let the scale govern it afterwards.

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Plan of a Compositor's Check Book.

Sig.	Set.	Imposed.	Charged.		Sig.	Set.	Imposed.
A					A		
B					B		
C					C		
D					D		
E					E		
F			Set in all.		F		
G			Sheets.	Pages.	G		
H					H		
I					I		
K					K		
L					L		
M					M		
N					N		
O					O		
P					P		
Q &c.					Q &c.		

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CHAPTER XXIV.

Composition in German, Greek, and Hebrew Characters.

In some of the large metropolitan printing-offices, and in country offices which have made a speciality of this kind of work, a very considerable amount of the composition is done in foreign languages, and with other than roman letters. In these offices both compositors and readers have to be acquainted with a variety of alphabets, and to possess a knowledge of at least their signification and use. The ordinary compositor seldom requires to know more than the roman and italic characters, for in these are set up all copy in the English, French, Spanish, Italian, and other spoken languages; as well as Latin, to a large extent the learned language of the whole world, past and present.

There are, however, two, or perhaps three, alphabets very commonly used, even in ordinary offices, which it is advisable the printer should understand—the modern German and the ancient Greek and Hebrew. The importance of the first—arising from the wonderful progress of late years of the people who speak it, and the extent and value of the literature in which it is employed—renders its acquisition very valuable. The two last are frequently used in quotations, in the best bookwork, and for this reason, if not for any other or higher one, they, or one of them at least—the Greek—ought to be familiar to the compositor who would be master of his business. It is also to be said, that work in each of these languages is very highly paid, compared with work in the English language—higher perhaps than it will be when a knowledge of foreign tongues is more generally diffused among the people of this country, and becomes, as it certainly will, a branch of ordinary school education.

It is suggested in the interests of printers who have not enjoyed a polyglot education, that the letters or types of unusual alphabets should be numbered, in Arabic numerals, on their sides, as furniture is marked, or as the mark or name of the founder is placed to machine-cast types.

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These numbers might correspond with a table of the alphabet. If the plan were perfectly understood, the copy could be written in figures, and the composition of the most abstruse language be rendered to the unlearned workman as simple as that of a line of numerals.

Neither the German nor the Greek language presents much difficulty, if the value and force of the characters composing their alphabets are understood. The doubts that arise are occasioned generally by the careless or awkward writing of the copy, some authors being very remiss in this respect. We propose, therefore, to give in regard to each: 1. A list of the characters of which the alphabet is composed. 2. Some remarks on the positions in which the accents and punctuational points are usually found. 3. The lay of the case, as adopted in the best modern offices.

The German Alphabet.

Character.					Signification.				
𝔄	𝔞		...	...	A	a			
𝔅	𝔟		...	...	B	b			
ℭ	𝔠		...	...	C	c			
𝔇	𝔡		...	...	D	d			
𝔈	𝔢		...	...	E	e			
𝔉	𝔣	ff	...	...	F	f	ff		
𝔊	𝔤		...	...	G	g			
ℌ	𝔥	ch	...	...	H	h	ch		
ℑ	𝔦		...	...	I	i			
𝔍	𝔧		...	...	J	j			
𝔎	𝔨	ck	...	...	K	k	ck		
𝔏	𝔩		...	...	L	l			
𝔐	𝔪		...	...	M	m			
𝔑	𝔫		...	...	N	n			
𝔒	𝔬		...	...	O	o			
𝔓	𝔭		...	...	P	p			
𝔔	𝔮		...	...	Q	q			
ℜ	𝔯		...	...	R	r			
𝔖	ſ	ß	ſs	ſt	...	S	s	s	sz	st.
𝔗	𝔱		...	...	T	t			
𝔘	𝔲		...	...	U	u			
𝔙	𝔳		...	...	V	v			
𝔚	𝔴		...	...	W	w			
𝔛	𝔵		...	...	X	x			
𝔜	𝔶		...	...	Y	y			
ℨ	𝔷	ß	...	...	Z	z	tz		
ä	ö	ü	...	...	äe	öe	üe		

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The following are the letters which are most liable to be mistaken for others, especially by compositors who are not acquainted with the language:—

𝔅 (B) and 𝔙 (V).

It will be seen that while the first has a line across the middle, the latter is open.

𝔊 (C) and 𝔈 (E).

The 𝔈 may be known by its small horizontal stroke in the middle, projecting to the right. The 𝔊 has not a stroke of this kind.

𝔊 (G) and 𝔖 (S).

The general round appearance of both these letters is pretty much alike, and, indeed, they are often wrongly printed, the one being substituted for the other. It will be seen, however, on examination, that the 𝔖 (S) has an opening at the head, while 𝔊 (G) is closed, and has also an upright stroke inside.

𝔎 (K) 𝔑 (N) and 𝔎 (R).

The first is rounded at the top; the second is open in the middle; the third has a crossing stroke in the middle.

𝔐 (M) and 𝔚 (W).

It is only necessary to observe that the M is open at the bottom, while W is closed.

𝔟 (b) and 𝔥 (h).

The b is altogether closed at the bottom, but h is slightly open, ending at the bottom with a hair line.

f (f) and f (s).

The f has a horizontal line completely through it, near the middle, while s has a short line on the left side only.

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m (m) and w (w).

The m is entirely open at the bottom, while the w is partly closed.

r (r) and x (x).

The x has a short hair-stroke at the foot, running to the left, which the r has not.

v (v) and y (y).

The v is closed at the foot, while y is a little open.

The latter also has a hair-stroke which is not found in the former.*

Lay of the German Case.—Within the last few years several important alterations have been made in the lay of the German case, having for their object the assimilation of the arrangements of those used in England to those used in Germany. We give the most usual "lay" at the present time in the principal London offices; and if the compositor understands this one, and the general information concerning the alphabet and the equivocal letters, so to speak, already presented, he will have no difficulty in working at others slightly varying in their arrangements.

Note.—The spaces left blank are filled up variously. The reference marks and figures (Arabic) generally occupy the upper boxes of the left-hand side of the case, and the commercial signs, such as $, ℔, /, the braces, dashes, and fractions, the left-hand boxes. It is not necessary, therefore, to appropriate the other boxes, especially as they are generally arranged as are the ordinary English cases in each particular office.

In this scheme only one box ot the ordinary roman

* It would be possible, no doubt, to find analogies in several of the other letters. The preceding list was drawn up by a practical reader, and embraces those letters only in which, as experience has shown, compositors are apt most frequently to make mistakes.

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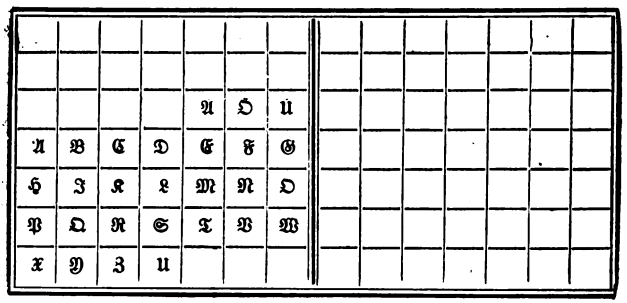
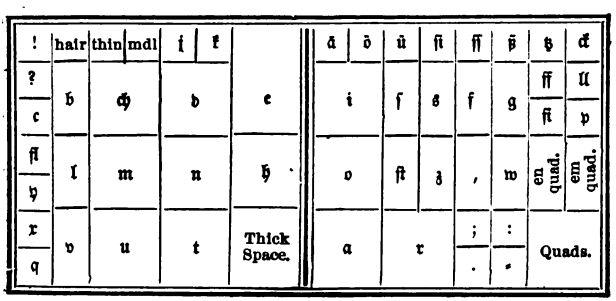
cases requires to be divided; and even this alteration may be prevented by mixing the thin and middle spaces, and using one of the boxes for one of the displaced letters.



Upper Case.

The lower case contains the bulk of the characters. The arrangement of spaces and points should be conformable to the lay of the other cases adopted in the office.



Lower Case.

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The Greek Alphabet.

The Greek letters are twenty-four in number, and are thus formed and designated :—

Character.	Signification.	Name.	Character.	Signification.	Name.
Α α	a	Alpha.	Ν ν	n	Nu.
Β β or ϐ	b	Beta.	Ξ ξ	x	Xi.
Γ γ	g (hard)	Gamma	Ο ο	o (short)	Omĭcron
Δ δ	d	Delta.	Π π	p	Pi.
Ε ε	e (short)	Epsĭlon	Ρ ρ	r	Rho.
Ζ ζ	z	Zeta.	Σ σ ς	s	Sigma.
Η η	e (long)	Eta.	Τ τ	t	Tau.
Θ ϑ or θ	th	Theta.	Υ υ	u or y	Upsĭlon
Ι ι	i	Iota.	Φ φ	ph	Phi.
Κ κ	k	Kappa	Χ χ	ch(hard)	Chi.
Λ λ	l	Lambda	Ψ ψ	ps	Psi.
Μ μ	m	Mu.	Ω ω	o (long)	Oměga

The Greek alphabet contains seventeen consonants and seven vowels. The characters are so distinct in their shape that they can hardly be mistaken one for the other. The chief difficulty in Greek composition arises from the accents; hence we extract the following from a grammar of the language.

The *accents* are three: the acute (′), the grave (`), and the circumflex (˜).

The acute may either fall on the last syllable, the penultimate, or the antepenultimate ; but no word in Greek is accented beyond two syllables from the last; the grave can only have place on the last syllable ; and the circumflex on either of the two last.

The *breathings* are two ; the rough, or *asper* (‘), and the smooth, or *lenis* (’).

The rough breathing is equivalent to our aspirated *h;* but the weak has no power.

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A vowel or a diphthong *may* be accompanied both by a breathing and an accent; as in the following instances: ἔλεγον, ὦ, οἵστρος, οἵτινες. These combinations have the following names:—

᾽ Lenis acute.
῾ Lenis grave.
῍ Asper acute.
῎ Asper grave.
῀ Circumflex lenis.
῞ Circumflex asper.

The following combinations also occur:—

῝ Diæresis acute.
῎ Diæresis grave.

The following rules may be pointed out as being essential to be known by the printer:—

A vowel or diphthong beginning a word has one of these aspirations over it; the vowel upsilon admits only of the asper.

The letter ῥ at the beginning of a work has an asper over it, and where two ῥ's meet in a word, the first has a lenis and the other an asper.

In diphthongs the accent and breathing are placed over the second vowel, as αὕτη., not ἄυτη.

The apostrophe (᾽) is used to show the omission of the vowels, α, ε, ι, ο, and the diphthongs, αι and οι, when they stand at the end of a word and the next word begins with a vowel, as—παρ᾽ αὐτᾷ for παρὰ αὐτῷ.

Sometimes the apostrophe contracts two words into one, as—κἀγὼ for καὶ ἐγὼ.

Sometimes an apostrophe supplies the place of a vowel beginning a word, as—ὦ ᾽γαθ for ὦ ἀγαθὲ; this occurs chiefly in poetry.

But the prepositions, περὶ and πρὸ, suffer no elision, though the next word begins with a vowel, as—περὶ ὑμῶν, πρὸ ἐμοῦ, &c.

The diæresis (¨) separates two vowels, that they may not be pronounced as a diphthong: thus, ἀϋτὴ with a diæresis makes three syllables, but without a diæresis αυ is a diphthong, and makes αυτὴ two syllables.

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The Greek note of interrogation is the Roman semicolon [;].

The colon, in Greek, is an inverted full point [·].

The following practical rules are very useful for the unlearned compositor:—

(1) No accent can be placed over any other than one of the last three syllables of a word.

(2) No vowel or diphthong can have the asper or lenis except at the beginning of a word.

(3) The grave accent never occurs but on the last syllable; and this being the case, the asper grave and lenis grave are required for only a few monosyllables.

(4) Almost every word has an accent, but very seldom has more than one: and when this happens, it is an acute, thrown back upon the last syllable from one of those words called enclitics, which in that case has none, unless it be followed by another enclitic.

(5) In no other case than this can a last syllable have an acute accent, except before a full point, colon, or note of interrogation, when a grave accent on the last syllable is changed to an acute.

The latter fact has often led compositors not understanding the language to believe there was an error in the copy, by seeing the same word written with two different accents. When their proof was returned to them corrected they have seen the mistake into which they have been led.

Greek Cases.—The following is a plan of Greek cases as used at present. Formerly a number of ligatures were employed which very considerably augmented the number of boxes required. Fortunately, these are now obsolete, and the boxes are fewer in number. Cases made on the old plan may be filled up by reference marks, &c.*

Note.—The characters ϛ, ϑ (*beta*, *theta*) are not cast in all founts. The space appropriated to them here may be assigned to the more usual forms of these letters (β and θ).

* The accented diræresis of ά, έ, ή, ό, ώ, are still sometimes cast, and they may be placed in the empty boxes on the right hand of the diagram.

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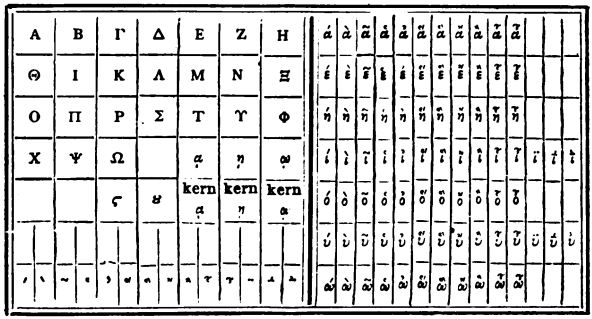
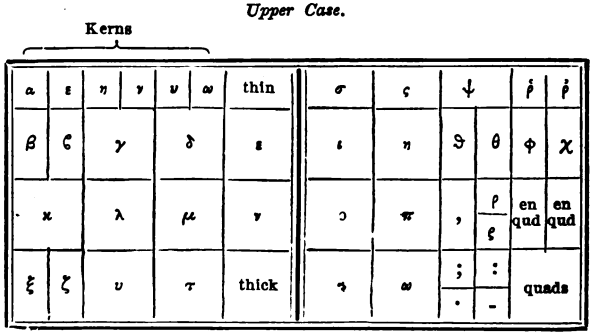


Upper Case.



Lower Case.

The Hebrew Alphabet.

The following are the letters of the Hebrew alphabet:—

Form.	Power.	Name.	Form.	Power.	Name.
א	Greek'	Aleph	ל	L	Lamed
ב	Bh, B, V	Beth	מ ם	M	Mem
ג	Gh or G	Gimel	נ ן	N	Nun
ד	Dh or D	Daleth	ס	S	Samech
ה	H	He	ע	Gn or ng	Ayin
ו	V	Vau	פ ף	Ph or P	Pe
ז	Z	Zain	צ ץ	Tz	Tzade
ח	Ch or H	Cheth	ק	K	Koph
ט	T	Teth	ר	R	Resch
י	Y	Yod	שׁ	Sh	Shin
כ ך	Kh or C	Caph	שׂ	S	Sin

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Hebrew words are never divided. The consonants, ב, ה, ך, כ, פ, ת, with a dot in them (dagesh) are hard; without, they have a soft sound: *e. g.*,

בּ = p. ב = ph.
הּ = t. ה = th.

In the case of other consonants the dot means that they are doubled. Hence five of the letters are cast broad, and used at the end of words for the purpose of justifying them. They are—

Aleph.	He.	Lamed.	Mem.	Tau.
א	ה	ל	ם	ת

The letters given above are all that are absolutely necessary in printing Hebrew. Various marks have, however, been invented for the purpose of denoting the vowel sounds, and thus to facilitate the reading of the language. They are called masoretic points, and a knowledge of them is indispensable to every compositor employed on Hebrew works with points. They are ten in number; five perfect, which, with their preceding consonant, form a syllable; and five imperfect, which have a consonant preceding and following them. Their names, figure, and power are shown in the following table:—

Name.	Fig.	Sound.	Name.	Fig.	Sound.
Kametz	אָ	*a* in father	Pathach	אַ	*a* in bad
Tzeri	אֵ	*a* in fated	Segol	אֶ	*e* in bed
Long Chirek	אִי	*i* in machine	Short Chirek	אִ	*i* in bid
Cholem	אֹ	*o* in go	Kametz Chatuph	אָ	*o* in bot
Shurek	אוּ	*u* in drop	Kibbutz	אֻ	*u* in but

Besides the above vowels, there is another, called *Sheva* (:), which has been introduced to facilitate the utterance of words where two or more consonants would otherwise come together. When it is sounded, it has the power of a very short *e;* as in the word *below.*

The Hebrew alphabet has no capitals; and, therefore, letters of the same shape, but of a larger body, are used at the beginning of chapters and other parts of Hebrew works

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Occasionally, also, certain words begin with a letter much larger than the body of the text; and a small letter is sometimes found in the middle of a word, as is, also, a final.

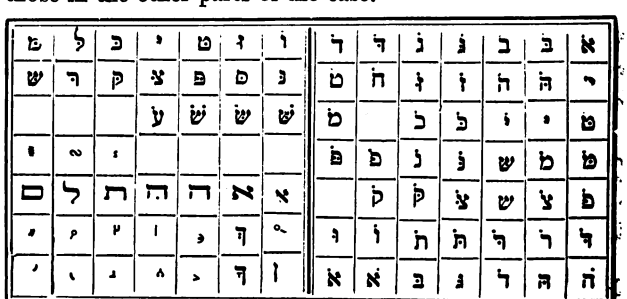
Hebrew is read from the right to the left. In composing, the compositor must cast off how much will make a line, and begin from that point, going backwards, and justifying the vowels and accents over and under the letters after the line of matter is properly adjusted.

Several of the Hebrew letters are very much alike, and unless the compositor carefully notes the difference, he will find his proof a very foul one when it comes from the reader. The following are the letters in which mistakes are most apt to occur:—

Beth.	Gimel.	Daleth.	Resch.	He.	Cheth.	Vau.	Zain.
כ	ג	ד	ר	ה	ה	ו	ז
ב	נ	ך		ת		ן	
Caph.	Nun.	Caph final.		Tau.		Nun final.	

Teth.	Mem final.	Ayin.
ט	ם	ע
מ	ס	צ
Mem.	Samech.	Tsade.

Lay of the Hebrew Case.—The following is the plan most generally adopted:—The spaces and quadrats on the left-hand side of the lower case are for the purpose of adjusting the points; the ordinary spaces and quadrats are those in the other parts of the case.



Upper Case.

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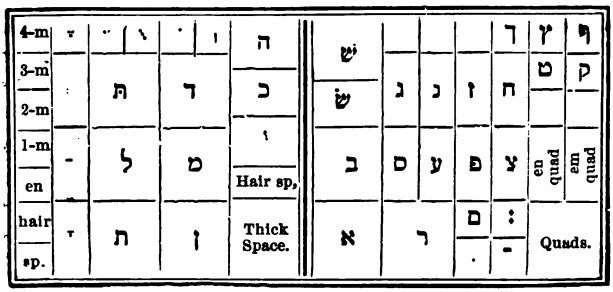
The dot over a consonant, at the left-hand side, is the letter o, which is then pronounced after the consonant.



Lower Case.

Note.—The portion of this chapter referring to Greek and Hebrew characters has been kindly revised by the Rev. W. T. SOUTHWARD, M.A., Fellow of St. Catherine's College, Cambridge.

CHAPTER XXV.

BOOKWORK MISCELLANIES—Chapter Head Lines—Indexes—Notes—Foot Notes—Shoulder Notes—Side Notes—Incut Notes—Under-runners—Preliminary Matter—Dedications—Prefaces—Contents — Errata—White-lines—Advertisement—Style generally—Use of Capitals.

THERE are some peculiarities about Bookwork which the compositor ought to understand, besides those named in previous pages, in regard to the proportions of pages and the dimensions of the margins. They will not only enable him to make up a forme with propriety and with confidence, but will qualify him, should he aspire to the position, to correct sheets when made up.

Head Lines to Chapters.—The author, publisher, or overseer usually arranges the style of the headings in a book, and in this respect nothing is left to the compositor. The latter, however, is called upon to see that in whatever style composed, all the headings throughout the work are

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alike. Inattention to this rule will invariably be followed by complete loss of character for the good workmanship of the book. Further, all the headings should be "whited out" alike; that is, should have the same blank space before and after them. This rule, however, may, in certain emergencies, be slightly departed from, but the greater the departure the more the work suffers in good looks.

Headings should be spaced a little wider than the body of the work, on account of the white space before and after them. The amount of spacing will depend upon the size of the letter and the degree of solidity of the page generally.

The small capitals of the letter in which the book is set were formerly almost exclusively used for the headings, but this plan has been changed, and the capitals of the same fount, or even italic capitals of a fount one or two removes smaller, are now much used. Some very excellently displayed headings may be seen in the publications of Messrs. Macmillan and Co., printed at the Cambridge University Press. Indeed, the general make-up of the pages of these books will well repay careful study.

Books printed to imitate the old style frequently have their headings in italic lower-case. In such cases care must be taken with the capitalling, which must be uniform throughout the volume.

Indexes are usually set in type two or more removes less than the body of the work, when practicable. The compositor must notice that they always begin on a right-hand page, and always are placed at the end of the volume.

Sometimes the index is not folioed continuously with the rest of the work, but that plan is objectionable. The word "index" forms the head-line. Over the various references and folios should be placed the word "page," or "paragraph," &c., as the case may be, and this should be repeated in the heading of each successive page over which the index extends.

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Indexes may be set in various styles, but as these are usually dictated by the author or master printer, they need not be described here. They may be in one, two, or more columns. The initial letter of each class, as A. B. C., may be inserted, in which case it should have a full-point after it.

In setting the points to carry the eye from the end of the last word to the figure in each line, several styles may be adopted. Leaders may be used as

Bookwork miscellanies..... 32

Full-points divided by em quads may be used also. In the latter case they may be so arranged as to form a vertical line down the page, thus:

Bookwork miscellanies 32
Bye-laws and regulations. 68

They may, however, be arranged in the style following, which, indeed, is that most usually adopted:

Bastard founts 41
Bookwork miscellanies 32
Bye-laws and regulations 68

When the whole of a reference cannot be got into a line, it must be turned over, and the indention made at the second line; that is to say, the lines are to be set "run out and indented."

Notes.—There are several kinds of notes, and they receive their names from their relative position to the other matter in a page.

Foot Notes (also called bottom notes) are placed at the end of the page. They are usually set in type two sizes less than that of the body of the page, if practicable. Of course, if the body of the type is small, the note must be the same, but this is to be avoided when possible.

In many of the old books a full rule is placed before the first note, to divide it from the text. This, however, is

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not often done now, a white space-line being considered sufficient. The difference in the type is enough to show where the text leaves off and the note begins.

Whenever the same type, or nearly the same type, is used for text and notes, the full rule may be inserted with advantage. On the Continent and in America a short dash or four em metal rule is placed at the beginning of a white line as a substitute for the full rule, but the plan does not recommend itself to us.

Care should be taken not to break a note at the bottom of an index page. If, however, it be absolutely necessary to do so, a catchword will have to be added.

The whites before notes should be uniform throughout the work. Varying spaces always indicate careless making up, and should be marked for alteration by the reader.

Shoulder Notes are placed at the top of a page. They generally consist of a repetition of the book, chapter, &c. Dates are frequently inserted in the inner margin of the head-line. Sometimes they are preceded by a bracket in the even pages, and followed by one in the odd pages. This, however, is a matter that will not be decided by the compositor, who will only be required to follow the style specified.

Side Notes or *Marginal Notes* stand at the outer margin of pages; that is, on the left-hand side of left-hand (or even) pages, and the right-hand side of right-hand pages. They usually contain either the authority for statements against which they are placed, or a summary of the contents of some quantity of matter. If the measure in which side notes are set is very narrow, the lines may be of varying lengths and need not be justified. If this be not done, very wide spacing will be necessary, or awkward divisions will have to be resorted to. If the measure is wide, side notes should, however, be in lines of equal lengths.

The principal point to be noticed in setting side notes is to get them in such a position that they begin just

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opposite where the matter to which they refer is placed. Some little trouble will occasionally be necessary to do this, but it is well worth it.

Sometimes, but very seldom, books have side notes on both margins of the page. The same rules apply to those on either side.

In-cut Notes, or *Let-in Notes*, are, as the name indicates, let into the text. A square place is made for them by a certain number of lines of text being shortened.

These notes should always have the same white at the beginning, side, and end. They should never, in any part of them, come close to the text, or they will destroy the appearance of the page and cause the reader to be confused.

They are always placed on the outer margin, whether of an odd or an even page. The type used should be the same as that in the foot notes.

Under Runners are continuations of side notes. When a side note is too long to be placed at the side of the text to which it refers, the latter may be divided, and part of the note let into it. This is also done to prevent a long side note displacing another. Under-runners, however, are very unsightly, and should be avoided whenever possible.

These notes must never be set out to the full length of the measure of the text, in order to avoid confusion. They should begin or end, as the case may be, three or four ems from the line.

Preliminary Matter.— The whole or part of the first sheet of a book comprises what is called the "preliminary" matter. It consists of the following, in the order here set out:—

1. Half-title.
2. Title.
3. Advertisement.
4. Dedication.
5. Preface or Introduction.
6. Contents.

After the last-named comes the text matter.

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Some books are deficient in certain of this matter, but the order of what there may be is always to be preserved, as given above.

Dedications are less in vogue now than formerly. They usually consist only of one page, and are displayed, something like a title, in capital or small capital letters; sometimes a mixture of both is used. Very large letters should not be used, and the general appearance of the page should be as neat as possible.

If the dedication should happen to exceed a page, it may be set up in type a size or two larger than that of the text. The name of the author should be set in capital letters.

Prefaces or *Introductions* may be in the same letter as the text, in which case it should be leaded or extra leaded. They may also be set in type one size larger than the text.

The word Preface or Introduction is generally placed at the beginning of the matter. It is usual to set it in the same type as that of the chapter headings.

In folioing or paging preliminary matter, roman numerals are used, generally lower-case letters. The half-title or title, or the first page, whatever it may be, is reckoned as i, and the blanks are also counted. But the numerals should not be inserted before the second page of the introduction. Sometimes they are placed in the centre of the line instead of at the beginning or end.

Contents are set in type one or more sizes smaller than the body of the work. Their general style will be that of the index, and the remarks already made on that point are applicable also to contents. They may be set to the full measure (which is the usual plan) or in two or more columns.

When the summary clause exceeds one line, the following lines should be indented. The figures should be brought close up to the end of the line when the clause can be got into one line, but if it cannot, the line should break off two or three ems from the end.

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Errata are best placed immediately before the commencement of the text. Sometimes it may be necessary, however, to insert them at the end of it.

White Lines.—Whenever white lines are necessary, they should be set up in quads. The use of leads or clumps for this purpose is not to be recommended. They should be uniform throughout a book, in similar places. White lines after headings are usually the same width or depth (we speak of a line having width, of course, in the conventional office language only) as that of the letter that the text is set in. If that, for instance, be long primer, the white line will consist of a line of long primer quads. In this way the whites in a book are made to "register," and all the headings and first lines of text to back each other.

When white lines are introduced into the text, it adds to the appearance of the page if they occupy space equal to certain numbers of lines, instead of being mere arbitrary blanks.

Advertisement.—What is called the advertisement, referring generally to the circumstances under which the book is brought out, is usually placed after the title, and set in type one or two removes less than that of the body of the work. Circumstances, however, often arise to interfere with these requirements.

It is conducive to the neat and orderly appearance of a book to set the *headings* of the different divisions of a book in various sized type, but graduating them; making the Part the largest, Chapter a little less, Paragraph smaller still, and so on.

Great care ought to be taken that the *indentation* of all the paragraphs throughout a book are alike. Non-observance of this rule is frequent, and invariably causes much useless trouble to the compositor.

Figures should be avoided in the text as much as possible, as they break the uniformity of the roman letters. For this reason it is best to print "nineteenth century;" not "19th century." Figures, however, should be used for *money*, *weight*, and *measure*. They should also be used in all cases where *contrast* or *comparison* is intended.

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Commas should be inserted after thousands in all cases, except in dates. For instance: 7,638, not 7638.

Numerals should be used in such cases as Henry VIII., not Henry the Eighth. Some authors, however, insist upon the latter style. Whatever plan is adopted, it must be observed throughout the entire work.

In quoting Holy Scripture, it is only necessary to put the number of the chapter in roman numerals and the verse in arabic to make the distinction, and there is no need to place the *c* or *v*. Thus, 1 Chron. xiv. 14; not 1 Chron. c. xiv. v. 14.

In book work, Street, Road, &c., generally have a capital initial, not a lower-case letter, preceded by a hyphen. Thus: Fleet Street, not Fleet-street.

Style.—The preceding directions are, it is thought, all that are generally required to be known by a compositor who devotes himself to book work. If they are understood and followed, any man who can set plain matter may understand this higher branch of the business.

There is, however, one point more to which attention must be directed. It is highly important that a compositor should familiarise himself with what is called the "style of the house." This sometimes affects not only punctuation, capitalisation, divisions, and spacing, but even the general practices already detailed. It must be thoroughly understood by the compositor or he cannot expect to have anything but dirty proofs.

Much of the compositor's time is, in some offices, undoubtedly lost in conforming to arbitrary and unreasonable rules. Matter that would be considered quite correct in one office is unmercifully scored by a reader in another office. Styles are as various, indeed, as the caprices and tastes of publishers and authors. One style insists on even spacing, no matter how words are divided; another style demands unexceptionable divisions, no matter how great may be the irregularity of different lines. One style follows Johnson, another Webster; one incorporates both. In punctuation there is a wide diversity, and in compounding and capitalising words there is no regular fixed law whatever.

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It would be only considerate, and would certainly tend to greater uniformity, if employers were to draw up a sort of syllabus of the mode in which compositors are to adopt doubtful usages. This would include ambiguous spelling, the punctuation, and the division of words. The adherence of different establishments to any one plan is not to be expected, perhaps, but it is only fair to decide upon a code of regulations, and have them printed, in order to save the time of the compositor, which is lost in making enquiries before he has set up his matter, or in corrections afterward; and in the latter case that of the reader may be brought into the question.

Capitalisation.—The following are a few general rules which are followed in a large office, and found to tend to greater uniformity. They may be modified as desired.

Titles given to royal personages, either by right or courtesy, to be kept up;* for instance, "his Majesty," "his Highness," &c. The word royal or imperial, usually preceding such title, to be kept down.

The titles of church dignitaries and members of the Government to be kept up when such titles are given in full, as "the Archbishop of Canterbury," "the Rector of St. Mary's." But should they be referred to as "the archbishop," "his lordship," "the rector," &c., they should be kept down.

The full titles of the heads of corporate bodies, such as the Lord Mayor of London, the Lord Provost of Edinburgh, &c., to be kept up; but when spoken of simply as the "lord mayor," the "provost;" &c., the town or city of which he is head being omitted—to be kept down. The only exception to the latter rule is in places where there is no necessity for giving the title in full.

Whenever the full and correct title of a public body is given, the same to be kept up; for instance, "the Thames Conservancy Board," "the Board of Works," "the Academy of Music," "the House of Lords," &c.,

* Where a word is begun with a capital it is said to be "kept up;" when it begins with a lower-case letter it is "kept down."

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but down when such is referred to as "the board," "the council," "the academy," "the house," &c.

The correct titles of all the law courts to be kept up, for instance, "the Supreme Court of Judicature," "the High Court of Justice," "the Queen's Bench Division," "the Bankruptcy Court," &c., but when referred to as "the court," without giving its title, the word court to be kept down. The latter rule to be observed when the word "sessions," "assizes," &c., occurs, preceded by the article "the." [General rules for *Law Work* will be given in a chapter specially devoted to that subject.]

The full titles of lectures, &c., to be quoted and kept up —such as, a lecture on "The Discovery of Prehistoric Remains in Sussex."

The several departments of the Government and the army and navy to be kept up—such as the Admiralty, the Board of Trade, the Horse Guards, &c.; also the word Volunteers, when used as a proper noun.

The word Act to be kept up only when the title is given in full, as the "Public Works Act."

The word Government to be kept up when used as a proper noun.

The *termination ise* and *ize*.—As great uncertainty often prevails in reference to this termination, we give the form which is printed and posted up in several London book work offices.

The following words to be spelled with the s; all others of the same description with z:—

advertise	despise	galliardise
advise	devise	manumise
affranchise	disfranchise	merchandise
amortise	disguise	misprise
catechise	divertise	premise
chastise	emprise	recognise
circumcise	enfranchise	reprise
comprise	enterprise	supervise
criticise	exercise	surmise
demise	exorcise	surprise

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One of the most essential requirements in good work is that the composition should be uniform. If this be not observed, either much time will be wasted on the part of the reader and compositor, or the appearance of the matter will be deteriorated. Where there is any special peculiarity adopted in an office, the overseer should issue printed or written instructions to the compositors as well as to the readers.

Some houses have a totally different system of using capitals and points to others. Some prefer wide spacing; while others consider that an average thick space is sufficient throughout the line. When, however, a volume has to be reprinted, and the type is somewhat wider in body than that previously used, the order is given to "set close," so as to bring the matter within the required limits. There are printers who would almost rather see an unusually wide spaced line than have a word divided. Some consider that leaded matter should be double thick spaced, or even a wider opening made between the words. Others allow almost any division of a word, provided that it is a legitimate one, rather than exceed thick spacing the line. Very wide spacing is known as "pigeon-holing."

Some houses "keep down," that is, use as seldom as possible, the capitals; while others use them very frequently. In many houses, where religious books are printed, it is a rule to begin with a capital such words as He, His, Whom, &c., when alluding to the Deity; and High Church works are usually printed with God, Jesus, Holy Ghost, when used personally, in small caps. Christ, the Saviour, Almighty God, &c., do not follow this rule.

It is most important to use figures systematically; and not to use words indiscriminately instead of them. Some houses prefer the ages of persons, or any other number, unless in statistical matter, in words rather than in figures. Others prefer a liberal use of figures to save space. Some again adopt the plan of putting all numbers under a hundred in words, and all over a hundred in figures. Newspapers generally set all numbers under ten in words. Figures, however, like capitals, break up the symmetry of the line,

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and are, to that extent at least, objectionable. Experience of the different customs practised in various offices is extremely valuable to a journeyman. He must, wherever he be, apply his mind to study the style of the house.

CHAPTER XXVI.

LAW PRINTING—Legal matter in Bookwork—Law Jobbing Work—Statements in High Court of Justice—Mode of Setting; Scale of Payment—House of Lords Printing.

THIS important branch of the printing business may be best treated of under two heads: 1st. That which is comprised under law bookwork, and consisting of legal treatises, reports (in book form) of cases, &c.; 2nd. That which may be termed law jobbing work, and consisting of documents for presentation to various authorities, or used in pleadings in the different courts, such as Statements of Claim, Statements of Defence, &c.

BOOKWORK.—The prime recommendation of a well-printed law book is the uniformity of its style throughout, that being founded on the standard books in use. This uniformity is especially to be maintained in the *contractions*, which are generally very numerous; and which, if ambiguous, might lead to confusion or error on the part of the reader.

Names of the parties to a suit are usually in Italic; but they may be in Roman. Whichever plan is adopted, it must be carried on throughout the work. *Authorities* must be in Roman if the parties are in Italic, and *vice versâ*. The most approved style is shown below.

If the name of the case be adduced in the argument, the authority follows in parentheses. If the case is added parenthetically, of course the whole is enclosed within the parentheses. The following are examples of each of these styles:—

"Counsel for the Plaintiff cited *Thomas* v. *Waller* (4 M. & W. 61) and *Jones* v. *Peterson* (Adol. & El. 703).

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"An action of this nature must be brought within the time specified (*Ray* v. *Kesterton*, L. R. 13 Eq. 876), otherwise it will fail."

It will be observed that instead of "and," the amperzand (&) is employed in quoting the authorities, and there is no comma after the full stop between the authority and the page.

The sign & is always employed in reciting the years of the reign of any monarch in which an act of parliament was passed; thus, 15 & 16 Geo. 3, c. 21. The numbers after the name are in arabic characters, because roman ones would be more cumbersome and much less explicit.

In all instances of this sort the figures should never be separated at the end of a line from that to which they belong; nor should the constituent parts of what forms but one portion of the reference. Thus in the instance given above, 15 should not end a line, which would cause the next to begin with &; neither should Geo. be separated from the accompanying 3; nor c. from 21. Nor in like manner, the letters denoting any office such as, Cockburn, C.J., where the C. and J. should always be in the same line. So in all other cases, for division of such parts would be both unsightly and confusing.

When a number of authorities are given with the reports where found, each case is separated from the following one by a semicolon in the following manner, if they depend or read on with what has been previously said. Thus: "The statute and authorities on which I rely (12 & 13 Car. 2, c. 14, s. 6; *Bell* v. *Bradfoot*, 6 T.R. 721; *Cooke* v. *Jonas*, 2 B. & A. 423) are conclusive on this point." But if they do not so depend, or do not form an interposed parenthetical sentence, a full stop may well be employed.

The *authorities*, already mentioned, are always contracted in the same form. Thus Co. Litt. is always the contraction for Coke on Littleton; Barnewall and Alderson's Reports always B. & A. As there are between 500 and 600 of these abbreviations universally recognised, our space will not permit of reprinting them here, but they

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may be found in the Catalogues of Law works, published by Messrs. Butterworths, of Fleet Street, and Messrs. Stevens, of Chancery Lane.

LAW JOBBING WORK.—This is now regulated by the Judicature Acts (1873 & 1875) and the Rules of Court framed thereunder. In the days of "Bills of Complaint" and "Answers" to the Court of Chancery, the documents printed were often very long, but of late years the length of pleadings has been much curtailed, particularly by the Rules of Court just issued (1883), the effect of which will be to diminish materially the amount of Law Printing.

The rules of the Supreme Court prescribe that certain documents *must* be printed. They are:—

All pleadings (*i.e.*, Statements of Claim, Statements of Defence, Replies, &c.) not being Petitions or Summonses, of 10 folios * and upwards in length (Ord. xix. r. 9).

Special Cases (Ord. xxxiv. r. 3.)

Answers to Interrogatories, if exceeding 10 folios, unless otherwise ordered by a judge (Ord. xxxi. r. 7).

Evidence taken by affidavit, pursuant to Order xxxviii (Ord. xxxviii. r. 30).

The following documents *may* be printed:—

Pleadings under 10 folios in length (Ord. xix. r. 9).

All affidavits, by consent of all the parties, or if ordered by a judge (Ord. xxxviii. r. 30).

Evidence on appealing, if ordered by a judge, or if a judge of the Court of Appeal shall subsequently sanction such printing.†

All these documents are invariably set in pica, and printed on foolscap sheets, made up into folio. In order to secure the proper margin (to be referred to presently), they are set to 30 ems pica. A full page is 55 to 60 ems

* A folio is 72 words, every figure comprised in a column, or authorised to be used, being counted as one word. (Ord. lxv. 12, 27 sub. s. 14.)

† The party printing without an order runs the risk of having to pay for it himself.

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long and contains about 40 lines. Each page is folioed, except the first, with a figure in the middle of the line, the first folio being 2. Some printers retain the system of putting a catch word at the end of each sheet, but this is not indispensable.

We have endeavoured to imitate in small type the style followed in printing a pleading, and with the following directions any compositor will be able to set one up.

With the exception of the lines "In the High Court of Justice," and "Statement of Claim," all the lines are set up in pica. The two exceptional lines are in black letter, which may vary from two-line pica to two-line great primer.

1883—S.—86.

Writ Issued 15*th October* 1883.

In the High Court of Justice.

CHANCERY DIVISION.

Fo. 12

BETWEEN JOHN THOMAS SMITH - PLAINTIFF.
and
JAMES ROBINSON, EDWARD THOMPSON and PETER JONES - - - - DEFENDANTS.

Statement of Claim

1. By an agreement dated the 10th January 1883 the plaintiff agreed to sell &c.

The Plaintiff claims

1. Specific performance of the agreement dated, &c.
2. Such further and other relief, &c.

A. POWELL.

Delivered the 2*nd Nov.* 1883, *by Mr. Abel Brown, of Lincoln's Inn Fields, Plaintiff's Solicitor.*

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The reference number is generally set in antique, and is always at the top of the page towards the right. The next line is set up in pica italic, and indented sufficiently to run out to the end of the line. The line of black letter begins the full measure; a rule, thick side up, its exact length is placed below it. The next line is indented 4 ems. The line commencing "between" is run out to the end of the measure, if the plaintiff's names and the word "plaintiff" can be got into one line; if not, then to within about eight ems of it, as in the case of the defendants' names above. "Between" and "plaintiff" are each in small caps with a cap initial. The name of the plaintiff is in capitals. The word "and," in lower-case, is in the centre of the name. The indentation of the next line is determined by the point whereat begins "John." Defendants', like plaintiffs' names, are invariably in caps, however many there may be—this is most important. Commas should be placed between the names of the respective parties, except the two last, which are divided by the word "and" in lower-case. The words "Plaintiff" and "Defendants" in the title are always at the end of the measure, and hyphens or leaders are used to connect them with the respective names. The next line, generally in black letter, is set to the middle of the measure. After it comes the first line of the text of the Statement.

This is set like ordinary matter, with these exceptions:—No grammatical point whatever is inserted, except the period. There are no commas, semicolons, colons, nor notes of interrogation or of exclamation, except those specially marked in the manuscript. The parentheses may be used, when distinctly marked by the author. Phrases may be quoted (with double points) if so marked in copy.

Dates are printed thus:—1st July 1875 or 1st day of September 1860, not in words.*

Sums of Money are printed thus:—£58,856 18s. 11d., or £277 8s. 7d., not in words.

---

* So ordered by the Rules of the Supreme Court, 1883. (Ord. xix. r. 4.)

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No *contractions* whatever are to be used; names especially must be set out in full, even if in the copy initials only be written.

Each paragraph is numbered, with an arabic figure indented 2 ems. A period is put after it, and the text commences as usual with a capital letter. Each paragraph is divided by a white line from the preceding one. There is a white line after the folio head-line also.

Quotations, such as extracts from indentures, if they make more than one line, have double-turned commas at the beginning of all the succeeding lines up to the last, when the usual double apostrophes are placed at the end of the sentence. The quoted portion is sometimes indented an em or two at the beginning of the lines, instead of having the inverted commas; the compositor must ascertain for himself the particular style followed in the house where he is employed.

At the end of the job, comes the "claim," thus:

The Plaintiff claims

1. Specific performance of the agreement, &c.
2. Such further and other relief, &c.

Here it will be seen that the first line is indented 4 ems from the body of the work, and the second line 4 ems more, *i.e.*, 8 ems.

Then, in some Statements of Claim, follow the words "Place of Trial, Oxford," or as the case may be. These begin at the commencement of the measure, without indentation.

At the end of the pleading comes the signature of Counsel. This is set in caps, and is run out to the right hand end of the line.

Then, after a white interval, the note of the date of delivery and the name and address of the solicitor. These lines are centred, and are set in italic, the name of the solicitor being in small caps.

Every pleading, and nearly every other document printed in an action, commences with the "title of the action," as

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shown in the annexed example. When there are several plaintiffs or defendants a comma should be placed between the names of those which are not separated by the word "and" (*vide* example).

The style thus detailed is founded on that generally adopted in the old Chancery Bills and Answers, modified and fixed by the following directions, extracted from the Rules of the Supreme Court 1883, to which printers must carefully conform :—

Order lxvi., rule 8. "Proceedings required to be printed, shall be printed on cream wove machine drawing * foolscap folio paper, 19 lb. per mill ream,† or thereabouts, in pica type, leaded, with an inner margin about ¾ inch wide, and an outer margin about 2½ inches wide."

This is a continuance of the Chancery rule. The margins, however, are not in practice strictly adhered to; so long as good broad margins are left, no complaint is made. For reasons suggested by the system of payment adopted for the work, as will be presently noticed, a narrow or condensed pica is most advantageous to the printer, as he gets more into a page and saves paper and making up. Any style of pica may be used, even old style. The leads used should be 4 to pica, but thinner ones are passed when thick leads would drive the matter out on to another page.

Folios.—By the Rules of the Supreme Court, 1883, Order lxvi. rule 7 (*m*), it is directed that "The folios of all printed and written office copies, and copies delivered or furnished to a party, shall be numbered consecutively in the margin thereof."

This rule is not strictly adhered to; it is useful only where the paragraphs are so long that the position of any passage may be fixed by reference to the figures in the margin, but otherwise these figures are not only of no use, but simply confusing.

* Drawing foolscap is not, as might be supposed, a kind of paper for drawing on, but a thick cream wove paper of the best quality and colour, very clean, and intensely hard-sized. The size is 16¾ by 13½ inches. It is known in the trade as "law foolscap."

† A ream of writing paper as it comes from the mill contains 18 quires of 24 good sheets, and 2 quires of 20 sheets of outsides, that is, damaged paper; 472 sheets in all, good and bad—this is called a *mill ream*.

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The Endorse.—On the back of the last sheet is printed the "endorse," of which the following is a specimen:—

1883. S. 86.

In the High Court of Justice.

CHANCERY DIVISION.

Fos. 12.

SMITH

v.

ROBINSON.

Statement of Claim.

ABEL BROWN,
Lincoln's Inn,
Plaintiff's Solicitor.

Imprint.

It is imposed as follows:—

(Endorse.)

1883. S. 86.
In &c.

SMITH
v.
ROBINSON.

Statement

A. BROWN,
&c.

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The head line is always nearest to the fold, and the width to which the matter is set is about a fourth of the depth of the foolscap sheet; say 18 ems. If a half-sheet of foolscap be folded into a fourth, the endorse should fall on the third quarter beginning from the top, as shown in the diagram.

In regard to *Special Cases*, it may be added that they, as well as Affidavits, Answers to Interrogatories, &c., are printed in the same style, and on the same kind of paper as Statements of Claim.

Writs and common forms are printed with blanks for the names to be filled in. We need not copy these to show the style, as they may be bought at any of the law stationers'. They are printed in the same style and on the same kind of paper as pleadings, but the endorsements of Notices are sometimes in bourgeois or brevier, instead of pica—they would otherwise occupy too much space.

Allowances for Printing.—By the Rules of the Supreme Court, certain specified allowances are made for printing. The result is that solicitors and suitors obtain such allowances and no more. Printers are not, of course, bound to do the work at the price for their customers, and the rates being in some cases unremunerative, they have frequently objected to do so. Generally, however, they consent to take these prices. The charges allowed are these:—

	s.	*d.*
"For printing, the amount actually and properly paid to the printer, not exceeding per folio...	1	0
"And, in addition, for every 20 copies beyond the first 20 copies, @ per folio.....	0	1

"And when any part shall properly be printed in a foreign language or as a fac simile, or in any unusual or special manner, or where any alteration in the document being printed becomes necessary after the first proof, such further allowance shall be made as the taxing officer shall think reasonable."

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Before the Rules of 1883 the scale was more liberal, viz.:—

	s.	d.
"For printing a document not exceeding ten folios	10	0
"And in addition for every 20 beyond the first 20 copies of any document not exceeding 24 folios	2	0

Some printers allege that the terms allowed by the Rules do not cover the endorse, and they have attempted to rectify the poverty of the specified payment by charging unusual prices for this page. Others have attempted to charge their customers extra for author's proofs, tabular matter, folioing and night work. With the exception of author's corrections, which are charged *ad valorem*, it is not usual to charge these extras, but to abide by the specified scale.

House of Lords Printing.—There are some peculiarities in the printing for the highest Court of Appeal, which ought to be referred to here.

The *size* of the paper is quarto, the dimensions of a page being about 8½ by 7½ inches. The margin is large, the measure to which the matter is set being 30 ems for the case itself, and the same for the Appendices. The case is generally printed in "English" type, and in the outer margin, against the first line of each page, and against every sixth line, is a cap. letter of the alphabet, A, B, C, &c.

Quoted documents are in smaller type; the documents in the appendices are in small pica or long primer; the marginal notes in brevier or bourgeois. In regard to the size of the type and the quality of the paper, the House has issued no special directions.

We extract from the "Standing Orders and Method of Procedure," under the Act of 1876, the following:—

"The Appeal is to be printed on parchment (quarto size) in such form as will allow paper copies thereof to be bound up with the printed cases."

"The Appeal and Appendix must be printed quarto size with seven or eight letters in the margin for facilitating

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reference, and should be submitted in proof to the clerks in the Judicial office."

"Where reference is made to a document printed in the appendix, the case must contain a marginal note of the page of the appendix containing such document."

In Appendix B to these Standing Orders are given directions for binding printed Cases, for the use of the Law Lords; as follows:—

1. Ten copies are to be bound in purple cloth, two of the ten to be interleaved, as far as the cases only.

2. The Short Title of the cause must be impressed on the back.

3. There must be a label on the side stating the short title of the cause and the contents of the volume; thus, "A. & others *v.* B. & others.

"Printed copy of the Appeal
"Appellants' Case
"Respondent B's Case
"Respondent C's Case
"Appendix

4. The volume is to be indented (or cut ledger-index fashion), and the names of the parties marked on the indentation to their respective cases.*

CHAPTER XXVII.

SIGNS—Religious—Bibliographical—Commercial—Mathematical—Numerals—Medical—Astronomical—Botanical—Chemical.

THE following is a list of various types used as symbols or emblems, which frequently occur in scientific and technical books, newspapers, &c. It is very desirable that the compositor should have a proper knowledge of their names, as well as their signification; and such knowledge

* This chapter has been kindly revised by Arthur Powell, Esq., of the Middle Temple, barrister-at-law.

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is absolutely indispensable to the reader, and even to the reading-boy.*

Religious Signs.

✠, the Cross, used in devotional books of the Catholic Church to denote where the reader is advised to make the sign of the Holy Cross. Roman Catholic dignitaries also use this sign before their names. By printers it is called the Square Cross, or Maltese Cross.

† The Latin Cross.

X St. Andrew's Cross.

℟ Response) Used in hymn-books, &c.
℣ Versicle)

* In some Roman Catholic service books the Star is used to denote the distinction between the part monotoned or intoned by the celebrant or the priest, and that repeated or sung by the congregation.

Bibliographical Signs.

d.l. description leaf. In the direction to the binder the position of plates is sometimes indicated thus :—

i. *d.l.* ii. The first plate on *verso;* then the *d.l.*, the second plate on *recto.*

d.l. iii. The description *verso* of one leaf, plate *recto* of another.

The brace shows that the leaves thereby enclosed face each other.

[a] *recto* (a right hand page).

[b] *verso* (a left hand page).

cal°. capitulo (chapter).

F, f, ff, fol. leaves.

h height of page.

---

* The above list is, we believe, the fullest that has appeared. Various hand-books have been consulted in its compilation, and their deficiencies supplied; a number of new signs being inserted, which we have found in use in some of the metropolitan printing-offices. The terminology is that of the modern text-books.

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3^{ns} ternions (three sheets of paper folded in halves, quirewise, or one inside another, giving 6 leaves or 12 pages).

4^{ns} quaternions (four sheets of paper folded quirewise, giving 8 leaves or 16 pages).

5^{ns} quinternions (five sheets of paper folded quirewise, giving ten leaves or 20 pages).

The following are the signs used in the catalogue of the Bodleian Library, and in other catalogues founded upon it:—

s. a. sine anno (without year of publication).

s. l. sine loco (without place of publication).

s. l. et a. sine loco et anno (without place, or year of publication).

s. l. a., et typ. Sine loco, anno, et typographi nomine (without place, or year of publication, or name of printer).

bl. l. black letter.

f. p. fine or vellum paper.

l. p. large paper.

b. m. blue morocco; *g. m.* green morocco; *r. m.* red morocco; *y. m.* yellow morocco; *r.* russia.

al. e. alia editione (another edition).

fol. folio (a sheet folded into halves, making 2 leaves or 4 pages).

4to or 4°, quarto (a sheet folded into fourths, making 4 leaves or 8 pages).

8vo. or 8°, octavo (a sheet folded into eighths, making 8 leaves or 16 pages).

12mo. or 12°, duodecimo (a sheet folded into twelfths, making twelve leaves or 24 pages).

16mo. or 16°, decimo-sexto (a sheet folded into sixteenths, making 16 leaves or 32 pages).

18mo. or 18°, decimo-octavo (a sheet folded into eighteenths, making 18 leaves or 36 pages).

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24mo. or 24º, vigesimo-quarto (a sheet folded into twenty-fourths, making 24 leaves or 48 pages).

s. signed (the signature printed; or, before the invention of signatures, written with a pen).

n. s. (not signed—without signatures).

Commercial Signs and Abbreviations.

$ Dollars.	@ At.*
£ Pound Sterling.	℔ Per.
/ Shilling.	℔ Pound Weight. †
°/₀ Per Cent.	ᵃ/꜀ Account current.

A1., A2. These are Lloyd's marks, and are modified as follows:—

A first-class vessel, in Lloyd's Register of British and Foreign Shipping, is said to be A1. The letter denotes that the hull is well built and seaworthy, and the figure that her rigging, anchors, cables, stores, &c., are efficient. The figure 2 implies that these were insufficient in quantity, or of an inferior quality. When a vessel has passed the age for the character A (four to fifteen years) it is registered A in red.

Æ. The designation of a vessel of the third class, fit to convey perishable goods, on short voyages only.

E. The designation of a vessel fit for carrying on a voyage of any length such goods only as are not liable to sea damage.

T. The designation of a vessel fit for carrying goods of the same sort on short voyages only.

MC. Letters used to indicate that the boilers and machinery of a steam vessel have been inspected and found to be in good order and safe working condition.

---

* The sign @ is sometimes used for "to," as "Cotton, 15d. @ 15½d."

† This sign should never have an "s" after it to form the plural. Libra, of which it is the sign, forms its plural libræ. It would be as reasonable to print "£s" for ℔ounds sterling.

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Agt. Agent.
&. And.
At 1 ms. dte. At 1 month's date.
Bot. Bottles.
Bdls. Bundles.
Bs. or Bls. Bales.
Blks. Blocks.
Brls. Barrels.
Bskts. Baskets.
Bxs. Boxes.
Brot. Brought.
Bu. Bushels.
Cht. Chest.
Ck. Cask.
Crt. Crate.
Cs. Case.
℮ Errors Excepted.
Fm. From.
Frms. Frames.
Frks. Firkins.
Gal., or g. Gallons.
Hhs., or hds. Hogsheads.
Int. Interest.
Kgs. Kegs.
Kil. Kilogrammes.
Lds. Loads.
Ldg. Loading.
Mdz. Merchandise.
Mkt. Market.
Mo., mos. Month, months.
No. Number.
Ord. Order.
Oz. Ounce.
Pckts. Packets.
Cld. Cleared.
Co. Company.
Cr. Creditor.
Cwt. Hundredweight.
Dte. Date.
Dr. Debtor.
Dft. Draft.
Do. Ditto.
Doz. Dozen.
Ds. Days.
D.st. Days' sight.
Dupl. Duplicate.
Dms. Demijohns.
Ex. Out of; as, ex *Palmyra*: Out of the steamer *Palmyra*.
Ex., or exche. Exchange.
Pkgs. Packages.
Pns. Puncheons.
Pbl. Payable.
P.ct. Per cent.
Recd. Received.
Rect. Receipt.
Sld. Sailed, Sold.
Shts. Sheets.
Skl. cs. Skeleton case.
Srns. Serons.
Sks. Sacks.
T. Tons.
Tes. Tierce.
t/a Their account.
Wt. Weight.
Yd. Yard.
XX. Ale of double strength.
XXX. Ale of triple strength.

Various signs are also used as trade marks, such as hearts, triangles, squares. They are cast in pieces, so that various combinations may be made. They are usually pierced in the centre, to contain letters or figures.

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Mathematical Signs.

$+$ Plus, and, or more.

$-$ Minus, less.

$\times$ Multiplied by, times, into.

$\pm$, or $\mp$ Plus, or minus.

Multiplication is also indicated by putting a dot between the factors, as:—

$2 \times 3 \times 4 = 24 \quad 2 \times 3 \times 4 = 2.3.4 = 24$

$\div$ or : Divided by.

Division is also indicated by writing the divisor under the dividend, with a line between them as, $\frac{a}{b}$; $\frac{6}{3} = 2$.

$=$ Equal to.

$>$ is greater than.

$<$ is less than.

$\backsim$ the difference between.

$\propto$, Varies as ; is proportional to.

The last sign must not be mistaken for the cursive or writing form of the Greek α.

: Is to; the ratio of
:: As; equal
} Used to indicate geometrical proportion.

•• Minus, the arithmetical ratio of
:: Equal, is equal to
} Used to indicate arithmetical proportion.

∞ Indefinitely great; infinity.

0 Indefinitely small; infinitesimal.

$\angle$ Angle.

$\wedge$ or ^, the angle between, as A ^ B.

Some mathematicians indicate the angle between two lines by placing one of the letters denoting the enclosing lines over the other, as, $\frac{a}{b}$, that is, the angle between *a* and *b*.

$\llcorner$ Right angle.

$\perp$ Perpendicular.

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$\parallel$ Parallel.

$\underline{\sim}$ Equiangular.

$\odot$ Circle, circumference, 360°

$\frown$ Arc of a circle.

$\triangle$ Triangle.

$\square$ Square.

$\square$ Rectangle.

$\surd$ Root, the radical sign. To denote any other than the square root, a figure (called the index) expressing the degree of the required root is placed above the sign.

$\overline{\quad}$ Vinculum.

[ ] or $\left\{ \quad \right\}$ Brackets.

| Bar.

f or F. Function. (Various other letters are sometimes used by mathematicians to indicate functions.)

D. Differential; as, $D\,x$, the differential of x.

Variation.

Δ Finite difference.

D. Differential, co-efficient.

$\int$ Integral; integral of.

$\int_b^a$, the integral to be taken between the value of b of the variable and its value a.

M. The modulus of a system of logarithms.

g. The force of gravity.

° Degrees.

′ Minutes of arc.

″ Seconds of arc.

R° Radius of a circle in degrees of arc.

R' Radius in minutes of arc.

R'' Radius in seconds of arc.

′ ″ ‴ &c. Accents used to mark the quantities of the same kind which are to be distinguished. When the number of the accents would be greater than three, the

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Roman numerals are used instead of them, as, a^{iv}, a^{v}, a^{vi}. The accents are often written below also, as a_{ii} a_{iii} a_{iv} a_{v}. a_{vi}. Figures, and also letters, are sometimes used for the same purpose, as, a^{1}, a^{2}, a^{m}, a^{n}, a_{0}, a_{2}, a_{3}.

^{1}, ^{2}, ^{3}. Indices placed above and at the right hand of quantities to denote that they are raised to powers whose degree is indicated by the figure, as, a^{1}: that is, the first power of a.

Sin. x. The sine of x.

Sin.$^{-1}$ x. The arc whose sign is x.

NUMERALS.—Characters used to express numbers, as the Arabic numerals, 1, 2, 3, &c., and the Roman numerals, I., V., X., L., &c. The Arabic system of notation is known to everyone who is acquainted with the rudiments of arithmetic, but the Roman, especially in the higher quantities, often gives some trouble even to educated persons. We therefore present it in a complete form:—

1.	I.	40.	XXXX., or XL.
2.	II.	50.	L.
3.	III.	60.	LX.
4.	IIII., or IV.	70.	LXX.
5.	V.	80.	LXXX., or XXC.
6.	VI.	90.	LXXXX., or XC.
7.	VII.	100.	C.
8.	VIII., or IIX.	200.	CC.
9.	VIIII., or IX.	300.	CCC.
10.	X.	400.	CCCC., or CD.
11.	XI.	500.	D., or I$\supset$.
12.	XII.	600.	DC., or I$\supset$C.
13.	XIII., or XIIV.	700.	DCC., or I$\supset$CC.
14.	XIIII., or XIV.	800.	DCCC., or I$\supset$CCC.
15.	XV.	900.	DCCCC., or I$\supset$CCCC.
16.	XVI.	1,000.	M., or CI$\supset$., or ∞, or $\bowtie$
17.	XVII.	2,000.	MM.,IICI$\supset$.,CI$\supset$CI$\supset$, or $\infty\infty$
18.	XVIII.,or XIIX.	5,000.	I$\supset\supset$, $\overline{\text{V}}$, or V ∞.
19.	XVIIII.or XIX.	10,000.	CCI$\supset\supset$, CM$\supset$, $\overline{\text{X}}$, X∞, or XM.
20.	XX.	50,000.	I$\supset\supset\supset$.
21.	XXI.	100,000.	CCCI$\supset\supset\supset$., CM., or C∞.
30.	XXX.	1,000,000.	CCCCI$\supset\supset\supset\supset$.

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Medical Signs and Abbreviations.

℞ Recipe or "take."

ā or āā. Of each a like quantity.

℔. A pound.

℥ An ounce.

ʒ A drachm.

℈ A scruple.

i stands for 1; ij for 2, &c.

ss. means semis, or half.

gr. A grain.

p. Particula; a small part (so much as can be taken between the ends of two fingers).

p. æq. (*partes equales*). Equal parts.

q. s. (*quantum sufficit*). As much as sufficient.

q. p. (*quantum placit*). As much as you please.

s. a. (*secundum artem*). According to art.

In medical works the quantities in the formulæ are set in lower-case letters. If the number end with an "i," a "j" is always used in its place, as viij, instead of viii; xj, instead of xi, &c.

Astronomical Signs used in printing almanacks and astronomical works:—

The Sun and Planets.

☉ Sun.	⊕ Earth.	♄ Saturn.
☿ Mercury.	♂ Mars.	⊙ Uranus.
♀ Venus.	♃ Jupiter.	♆ Neptune.

Moon's Phases.

● New moon.	○ Full moon.
☽ First quarter.	☾ Last quarter.

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Aspects and Nodes.

☌ Conjunction. * Sextile. ⚺ or ⊙ Quintile.
□ Quadrature. △ Trine. ☍ Opposition.
☊ Ascending node. ☋ Descending node.

Signs of the Zodiac.

Spring Signs.	1.	♈ Aries, the Ram.
	2.	♉ Taurus, the Bull.
	3.	♊ Gemini, the Twins.
Summer Signs.	4.	♋ Cancer, the Crab.
	5.	♌ Leo, the Lion.
	6.	♍ Virgo, the Virgin.
Autumn Signs.	7.	♎ Libra, the Balance.
	8.	♏ Scorpio, the Scorpion.
	9.	♐ Sagittarius, the Archer.
Winter Signs.	10.	♑ Capricornus, the Goat.
	11.	♒ Aquarius, the Waterman.
	12.	♓ Pisces, the Fishes.

The Asteroids or Minor Planets.

In old books on printing, a number of signs are given to represent the minor planets, such as ⚳ Ceres, and these signs still figure in the type-founders' specimen books. Astronomers, however, have for some years back discarded them, and represent the asteroids by numbers, indicating the order of discovery, and enclosed in circles.

The names of the asteroids will be found in the modern works on astronomy, hence it is not necessary to repeat them here. The printer, however, is required to know the signs and abbreviations used in notation. They are:—

a or ^{a}. mean distance. *a* or *A.R.* right ascension.
β Celestial latitude. *D.* Diameter.
δ Declination. *E.* East. *e.* Eccentricity.
h or ^{h}. hours. *i.* inclination.

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L, l, or ε. Mean longitude in orbit. λ Longitude.
M. Mass. m or ^{m}. Minutes of time.
μ or m. Mean daily motion.
N. North. ν, Ω, or L. Longitude of ascending node.
π or $\tilde{\omega}$. Longitude of perihelion.
ρ or R. Radius, or radius vector. S. South.
s or . Seconds of time. T. Time (periodic time).
W. West } Φ angle of eccentricity or geographical latitude.
° degree. ′ minutes of arc. ″ seconds of arc.

Botanical Signs.

☉ an annual plant.
♂ a biennial plant.
♃ or △, a plant with a woody stem.
△ an evergreen plant.
⊙ a monocarpous plant.
♂ a staminate, or male plant.
♀ a pistillate, or female plant.
☿ a perfect or hermaphrodite flower.
♂ ♀ unisexual.
♂ — ♀ monœcious) turning to the left.
♀ : ♂ dicœcius (turning to the right.
♀ ♂ ♀ polygamous.
○= cotyledons accumbent, radicle lateral.
○ ‖ ,, incumbent ,, dorsal.
○ > ,, conduplicate ,, dorsal.
○ ‖ ‖ ,, folded twice ,, dorsal.
○ ‖ ‖ ‖ ,, ,, thrice ,, dorsal.
∞ or 0 0 an indefinite number.
0 wanting; the absence of a part.
° feet. ′ inches. ″ lines.
? indicates doubt. ! indicates certainty.

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Chemical Signs.

. One equivalent of *oxygen*. It is printed above a symbol representing an element, and repeated to indicate two, three, or more equivalents.

, One equivalent of *sulphur*, used in the same manner as the preceding.

\+ united with; (in organic chemistry) a base or alkaloid.

— do. an acid.

(these are placed above the initial letter.)

Every elementary substance is now represented in chemical notation by a symbol, consisting of the initial or abbreviation of its Latin name, as H for Hydrogen, O for Oxygen, Ag. (from Argentum) for Silver. A compound body, made up of single equivalents of its constituency, is represented by the two symbols of the respective constituents written side by side, as H_2O, a compound of two measures by weight of hydrogen with one of oxygen, forming water.

A secondary compound, as a salt, is indicated by the symbol of the constituent compounds one after the other, with the sign + between them, the symbol of the base being always placed first; thus: $CaO+CO_2$ represents carbonate of lime (lime united with carbonic acid). A comma is sometimes used instead of the sign +. The period is also sometimes used to indicate a union more intimate than that denoted by the sign +, but less so than that implied by a comma.

CHAPTER XXVIII.

Various Kinds of Composition—Directions for Setting Poetry—Algebra—Interlinear Translations—Diagonal Lines—Formes for Two-colour Work.

In setting up *Poetry*, if the matter is not intended for bookwork, the first consideration is to find the measure for the stick. Of course in bookwork the measure is determined by that of the other pages.

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Look over the copy, and select the longest line. Set that up, and cast off the number of ems to which the stick has to be made up. The chief requirement in this kind of work is to get the poetry as near the middle of the page as possible. The lines, being of irregular length, will frequently extend further over the page on one side than on another, but this should be avoided as much as possible.

The next thing is to decide upon the indentation. When the copy is in manuscript this point often gives trouble to the tyro, as he does not know what lines to make full out, and what to set in. A few directions may therefore be useful.

The principal object of indenting poetry is to render apparent to the reader the lines that rhyme. These must be so set up as to agree with one another, as in the following example:—

The Church's one foundation
  Is Jesus Christ her Lord;
She is His new creation
  By water and the Word:
From heaven He came and sought her
  To be His holy Bride,
With His own Blood He bought her,
  And for her life He died.

Here it will be seen, the lines ending respectively with "foundation" and "creation," "Lord" and "Word," are similarly indented. If two lines come together that are rhymed, they must, following the same rule, have an equal indentation, as in the two last lines (or refrain) of the following verse:—

Faith of our Fathers! living still,
  In spite of dungeon, fire, and sword:
Oh, how our hearts beat high with joy,
  Whene'er we hear that glorious word:
Faith of our Fathers! Holy Faith!
We will be true to thee till death.

If a line be too long for the measure, the end of it may be turned over to the extreme length of the following line, and a bracket may be prefixed to it to divide it from

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the succeeding line. This plan, however, is not as neat in appearance as that of making a fresh line (considerably indented) of the redundant matter.

The first word in each line of poetry should begin with a capital letter. In some kinds of humorous poetry, however, a word is occasionally broken at the end of a line, to make a rhyme, and the remainder placed at the beginning of the next line. In this case the rule as to commencing a line with a capital is not adhered to.

Some lines being very short in proportion to the others, are usually indented several ems, as in the following example :—

> Shades of the night are falling all around us,
> Shine through the gloom, O Light of Light Eternal,
> Sons of the Day, we seek Thee, Jesu, Master,
> Lighten our darkness.

Some printers say that the indentation should be one em for each foot of which the line is short, but this rule is seldom acted upon, and is sometimes not practicable.

Algebra.—The composition of algebra is much more difficult than would appear at first sight. This is owing to the apparent familiarity of the matter, the necessary sorts being contained in nearly every ordinary fount, with the exception of a few signs. It is the proper arrangement of the matter (which cannot always be indicated on the manuscript copy) that gives trouble to the compositor. The rudiments of algebra are so simple that the compositor who has much of this kind of work to do would find himself well repaid by devoting a little time to acquiring them.

The algebraic quantities are almost invariably set in italic lower case. But if it should happen that the explanatory portion of the work is in italic, then the algebraic quantities are set in roman lower case, by way of contrast.

If capitals are used, they must necessarily be in Roman, not italic.

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In setting two or more lines, the similar expressions in each should be placed one above the other as:—

$$\begin{array}{rcrcrcr} 8x & + & 9y & + & 8z & = & 2700 \\ 12x & + & 12y & + & 10z & = & 3600 \\ ax & + & by & + & cz & = & d \\ a'x & + & by & + & c'z & = & d' \\ a''x & + & b''y & + & c''z & = & d'' \end{array}$$

When an equation is too long for the measure of the page, it should be divided either at the + or =, and each part must be justified in the centre of the line which it occupies.

Such words as "hence" or "therefore," when used in this kind of work, should be placed at the commencement of the line, and when a figure is put in as a direction to some other formula it should be put, within parentheses or brackets, at the outer end of the line.

The short part of a fraction should be justified in the centre of the long, without reference to being either divisor or dividend, and the space rule which separates them should be equal in length to the larger part, as

$$\frac{bcx - y}{a} = \frac{\mathrm{R}}{0{\cdot}00001}$$

In putting together such examples as the above, the most expeditious mode of proceeding is, to look along the line and compose the longer part of each fraction with the signs which may be between them; as—

$$bcx - y = 0{\cdot}00001$$

The lines so composed should be placed on a galley, and each of these portions can be put in the composing stick as required, and the remainder of the compound line can be finished with very little trouble and without loss of time.

Some printers use a period in the ordinary position as the decimal point, others invert it, making the dot like

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a superior; whichever plan is adopted it must be carried throughout the work.

Interlinear Translations.—In composing work of this kind, the lines must be spaced so that the translation will be under the centre of the text. In order to do this correctly, the compositor must set up the longest word or phrase in both until the line is filled, when it will appear thus:—

Omnes the villages; *atque omnia* the buildings which, *quisque.*

The words of the translation must now be taken out, and the short words of the text justified in the centre of the spaces, in the following manner:—

Omnes *vici* *atque* *omnia* *ædificia,* *quæ*
all the villages and all the buildings, which
quisque.
anyone.

Diagonal Composition.—Effectiveness is often sought after in jobbing work, by running some of the lines obliquely across the page, and by arranging the matter so that it assumes a diamond shape.

The method of doing this is as follows:—Get four pica clumps, or cut four pieces of reglet, of the size required to fill the paper. Then mitre them to the angle of 45 degrees. Put the ends together (like a picture frame) and tie the whole firmly with page cord.

Begin by setting the central line; put in the leads above and below it. Next set the line preceding it, again putting in the leads: after that the line following, and so on till the whole is finished. The leads will have to be adapted in length to the diminishing shape of the whole. If this be carefully done the matter, if not very large, will lift. When it has to be locked up, the page cord should remain on. The founders supply angle brasses, like rules bent to a right angle; these will be found useful for binding the mitred ends together.

For very large work a chase should be used, in the manner of the frame above referred to. Pieces of wooden

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furniture of a proper length may then be placed across the angles, and the composition proceeded with, as already directed.

Composition for Colour Work.—There are several ways of setting bills, &c., which are intended to be printed in more than one colour, and each of these has its own advocates who prefer it to any other system. We will endeavour briefly to describe the various methods.

The first plan is to set up the bill in its entirety, as though it were all to be printed in one colour. Lock it up, and pull a proof. Select the lines that are to be printed in the different colours, unlock the forme, and take them out. The exact space which they occupied must be filled up with furniture. Then lock up the forme again and pull a proof. Fold this down the middle and apply it to the lines, to ascertain whether they are all in their proper positions. The same method will be followed in regard to each of the formes. The chief point in this kind of work is to get the lines to fall correctly; if they do not, the register will be destroyed. Two requirements are, in fact, involved: the formes must be accurately made up, and the sheet must be accurately laid on the tympan. If either is done imperfectly the appearance of the work will suffer. It is advisable to pull a few blank sheets without rolling over the entire forme. The indentations in the paper will sufficiently show the position of the lines. When each colour forme is made up, it can be proved on one of these sheets, and if the coloured lines exactly coincide with the previously impressed lines, the accuracy of the making up of the forme will be shown.

If only a few copies of a job are wanted, it may save time to adopt another plan. The lines in the different colours may be lifted out and inked, and then dropped into the forme again. Thus one impression completes each sheet. This is the most expeditious way of working window bills and show cards of which, perhaps, not more than half a dozen copies are required. It also secures perfect register.

If the line be of very large wood type, it may sometimes be advantageous to fasten the letters together by tacking

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them to the reglet. In this way they may be lifted out as easily as if they were in one block.

Houghton, in his "Printers' Every-day Book," says:—"Suppose the forme is to be worked, for instance, in black, red and blue, and that it has been well washed and corrected, and is again dry enough to go on with. The forme being fastened on the press table, and made ready in the usual way, take out the wooden lines to be worked red, and tack each letter to the reglet on each side, so that it can be easily made to lift in a lump; it is, therefore, always best to select those in wood for this purpose. Should the lines require overlaying, paste them to the bottom as underlays. The red lines being now ready, proceed in the same way with the blue lines, and make them also as they will lift like so many single lumps of wood. Tightening now the remaining portion of the forme, by pressing the quoins up tightly with the fingers, roll it over with the black. If all the lines be properly justified there will be no difficulty experienced from letters rising. Roll now the lines which have been tacked to reglets to lift out easily with their respective colours, replace them in their proper places in the forme, and again tighten all the quoins. The sheet being now pulled is perfect, which no other system can improve. This being done the quoins are again slackened, the different lines taken out and rolled with their own colours, the forme on the press again rolled with black, the lines replaced and the forme again quoined and pulled; which is continued, of course, till the forme is off. If an objection be raised to this system on account of the apparent loss of time in taking out the lines every time the forme is pulled, it should be recollected that in this there is only one making ready, while in working the colours separately there are three; that the frisket is only pasted and cut out once, instead of thrice; that there are no points used, and that the sheet is only once put on and once taken off the tympan; and that the sheet is only once pulled; whereas by the old system every sheet goes through the pressman's hands and is pulled three times. But even allowing that three colours may be worked by underlaying the lines with nonpareil reglet, and each

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colour worked separately at the same time, still the method which I have endeavoured to explain has a decided advantage, in the accuracy with which every coloured line falls in its proper place."

The alternative plan, incidentally referred to by Houghton, is rather a clumsy method of obtaining register for the lines. Instead of "dissecting" the forme, as already mentioned, the type is kept intact, but the lines to be printed at each working are raised up by means of nonpareil reglets and alone get printed, the other lines being so much lower, escape the impression.

In the preceding chapter we have found it necessary to use several terms which the young workman will not comprehend until he has read some subsequent chapters. Practically this need not cause inconvenience, as apprentices who have not learned press-work are seldom set to this kind of jobs.

CHAPTER XXIX.

DISTRIBUTING—Points to be aimed at—Accuracy and Rapidity—Laying up the Matter—Process of Distributing—Hints and Cautions.

THE process of *Distributing* may be said to be the converse of that of *Composing*. The latter consists of the lifting of letters out of their boxes and composing them in such order as to constitute words, sentences, and paragraphs. The former may be termed *de-composing* such composed matter, and returning the several letters to their proper boxes in the case.

The two principal points to be aimed at in learning to distribute are, to do the work, 1st, with the utmost "cleanliness," that is, correctness; 2nd, with the utmost rapidity.

It is obvious that unless distributing is correctly performed, a case will soon get into a state of pie; and that

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it cannot then be set up without making many errors. As compositors usually distribute their type before they begin to set it up, it is equally clear that it is to the workman's own interest that he should return the types to their proper places, in order to avoid having to correct or change them, as already described, in the stick or in the forme. Hence the desirability and the necessity of exercising great care in this department of the compositor's business, one which we are sorry to say is too often done carelessly, and as though it were a sort of "necessary evil." Again, although a considerable proportion of every man's time must be devoted to distributing, yet that amount of time should be minimised as far as it can be, in order that as much as possible may be devoted to composition, for compositors on piece are paid, not for the amount of matter they distribute, but for the amount of matter they set up.

As compared with composition, distributing is done with remarkable rapidity. A good workman will distribute from 4,000 to 6,000 letters per hour, but the quantity depends to some extent upon the size of the type, and the condition and character of the matter.

We have already watched the progress of a piece of matter from the time it leaves the composing stick until it is corrected, locked-up, and sent to press. Press work forms a separate section of this treatise, so we will now pass it over. The pressman, having worked the forme, is expected to "wash it over" with lye or other detergent * to clear off any remains of the ink with which the printing has been done. The surface of the type, the furniture, the quoins, and the chase, should be perfectly free from ink, and incapable of soiling the fingers.

The first thing to be done is to "drop the forme," that is, to set it on a letter board or an imposing surface. Rear it up on one edge, and hold it by both hands at the opposite one. Then slowly lower the latter edge until

* Remarks on washing over formes and recipes for detergents will be given subsequently.

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the forme is flat down on the surface intended for it. Do not let it go down with a "bang," as careless compositors are inclined to do; nor, on the other hand, let it down too slowly, lest any loose letters may drop out. If letters do happen to drop out and fall underneath the forme, it must be raised again, and the letters removed; for if left, they will cause considerable trouble hereafter.

Next, unlock the forme all round; not roughly or suddenly, but slowly and carefully. Drive each of the quoins just a little out of its place, to loosen it, before you take it out altogether. Begin with the quoins that are nearest the thin ends of the side and footsticks, and go round the forme till you get to the quoins nearest the thickest parts of the furniture. Remove a quoin from each side of the forme alternately; you will thus gradually get them all away from the matter without distorting it, or causing any of the type to become squabbled. Generally speaking it is desirable to loosen the quoins at the side first, as leads are apt to be bent when quoins at the foot are loosened first.

Remove the chase, the furniture, and the side and footsticks next. If the matter is rather "shaky," however, and the types manifest an inclination to fall down when unsupported, it is advisable to wet it slightly, especially at the edges. Get a basin of clean water and take up a little with the closed fingers. Then sprinkle the type with as few and small drops as may be; but do not "deluge" the matter. A sponge may be used for this purpose; but not a lump of paper, which is apt to get dissolved and, in a condition of papier-maché, is likely to fill up the face of the type. Take away the headings, if they are wanted again; tie them up and place them neatly on a galley. If there is any part of the matter that is required "to stand," that is, to be used again, take that away also, tie it up, and put it by in a safe place. Put the furniture, the quoins, chase, &c., in their proper places, and you will have the matter ready for operating upon.

Laying up Matter.—News formes are generally "dropped" or laid down on an imposing stone. After

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the furniture and heads are taken away, the page is given up to the compositors for distribution, each taking about as much as will go on a newspaper slip galley. A sheet of bookwork is generally dropped upon a letter board, and each compositor takes his share of the pages and puts it on his bulk by the side of the frame; a small job will be entirely distributed by one compositor.

Having received permission to take his share of the matter, the compositor will carefully slide it on to a proof galley, secure it at the side with a sidestick and quoins, take it to the washing trough,* and pour on it a quantity of water, completely rinsing it. † While the water is running into it he should work the type rather loose with his fingers, but not so loose as to cause a squabble. In this way the lines will get some of the water between them, and the letters, should they have become stuck together, will be loosened. If the letter is laid on a board in the trough, care should be taken that the board is perfectly clean, especially on its upper surface. This working with the fingers removes any ink which may have settled down into the cavities of the face of the type, and any lye which may have remained after the washing over of the forme. It also gets the matter into proper condition for distributing each type.

Laying-up is a very important operation. If done carelessly, the result is dirty type, which never prints well, and causes during composition many lines to be broken, as the dirt makes them spring when they are tightened. Some of the detergents contain chemicals which are very poisonous, if introduced into the blood through a cut on the hands. Dirt also renders the letters slippery, and they then fall through the fingers into wrong boxes in distributing.

However carefully the forme has been washed over, the

* The washing materials, including the trough, will be described hereafter.

† In laying the matter on the galley, always place it so that the first line is next to the head ridge of the galley and the beginning of each line against the side ridge. It shows much carelessness to put matter down in any other position. Close the matter well up to the top. If lines in the middle of the matter have to be taken out of their place, close up the rest of the matter without delay. Non-attention to this is a prolific cause of pie.

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first rinsing will show the presence of dirt *between* the letters. Water should be applied until it runs off perfectly clear and clean. Then the type may be taken out of the trough. Examine the latter carefully to find any letters that may have fallen out during the laying up. In offices where careless practices prevail, the trough contains sometimes a handful of loose type. This is very destructive to the type, and a sure sign of dirty workmanship. Matter on a galley should be carefully drained of all superfluous water before being taken from the trough; otherwise the water will run into the compositor's case, help to rot it, and make it exceedingly uncomfortable to work in.

Distributing.—Before actually beginning to distribute the types, the workman should examine whether his cases are clean and tolerably free from pie. If there is an accumulation of dust in the boxes, it should be blown out with a bellows, the nozzle of which should be held close down to the boxes. If there is pie, it should be cleared away before fresh type is thrown on the top of it. The space and quad boxes should be looked to; they often harbour pie, broken leads, bits of rules, &c. When all this has been done, holding the cases by their sides, give them a good shaking, to level the heaps of type in the different boxes. Do not, however, use unnecessary violence. Next, lay the galley (if the matter is on a galley) in some convenient place near the case, and you are ready to distribute.

There is so much variation in the lay of the case in different offices that it is the duty of a compositor to examine every new case upon which he works, and to see how it has been arranged. Inattention to this point will inevitably result in confusion and pie. It is also better to know this *before* beginning than to find it out by degrees afterwards, or as the necessities of each letter that come next will require. A plan of the cases saves time to the compositor, as it renders unnecessary examination of the boxes. We often wonder why so few offices have printed plans of their cases. A little plan, such as that given in Chapter V., might be set up, and a copy given to each new hand. It would cost little trouble, yet be the means

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of saving much, and tend to keep the cases clean, which is essential to quick and correct work, and is a criterion of the kind of supervision prevailing in the office generally.

In order to show him the *principle* of distributing, we will ask the young compositor to take up between his finger and thumb a word, in types, and then to let each letter fall into its proper box, keeping at the same time the remainder of the letters in proper position. The types must not be held tightly ; only tightly enough, in fact, to retain them between the fingers. Move the hand well over the case ; that is, do not throw the type any considerable distance. Rather let the hand be above the box, and let the type fall into it naturally. But the hand should not be too high above the case—three or four inches is quite sufficient. As the letters are distributed, and the number gets less and less, move what remain above to the extremity of the fingers by pushing them slightly forward with the thumb. As he proceeds, the compositor will acquire with practice more confidence, and hold the types less tightly. He will soon find out with how little pressure the letters, especially if damp, hold together. If nervously clutched, the types cannot possibly be quickly distributed ; and one of the essentials of rapid distribution is to retain them in the grasp of the thumb and forefinger as lightly as is necessary.

Care should be taken to distribute only one letter or type at a time. Even if there are two letters of the same kind together, there is no time saved in departing from the rule of distributing one type at once, and doing that as quickly as possible. If perchance two different letters get thrown into one box, the wrong one must be immediately looked for and put into its proper place, before another type is distributed. This rule admits of no exception. The beginner should take up a few letters, as many only as he can conveniently hold between his thumb and forefinger, and try to distribute them as fast as he can consistently with correctness. If possible, always take up a complete word and the point or space which may follow it.

He may next take up a complete line of matter, and

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try to distribute that. Put a setting rule at the back of a line, which should be the last on the galley, or the last of any given portion, and take the whole up by pressing at the beginning and end of the line with the first finger of the left and right hands respectively; the thumbs supporting the matter. Then hold the matter with the right hand only, inclining it towards the hand in order that no part of it may fall off the rule. Meanwhile, partially open the left hand, with the palm nearest the eye, the fingers extending in an horizontal direction, and the thumb pointing upwards. Place the rule and the type it contains on the first finger, but incline the matter so that the thumb affords a support for the beginning of the line. Indeed, the line should be at an angle; the end of it higher than the beginning. The types will now be quite secure on the left hand. All their nicks will be uppermost; their faces will be next to the body. This is the essential situation for the letter; no other is possible.

The right hand is free; it is to be used for taking away in small portions at a time the matter to be distributed. Remove only a small portion at a time; as just recommended, a word and its space, for instance. When that is distributed, take another word, and so on till the whole line is exhausted. Beware, as you get to the middle of the line, that the type does not lose its balance; above all, keep the whole steady, and avoid any movement which might cause it to be spilled into the case.

After practising with a few single lines, the compositor may go on to take up two, three, and four lines at a time. The manner of doing this is much the same as taking up single lines, except that the second finger of each hand must be extended according to the depth of the matter, to keep it secure at the sides while it is being lifted.

We would caution the inexperienced against taking up too much type at first. If he do so, he is nearly sure to spill it into the case, and incur the trouble of picking out the wrong letters from the different boxes.

Finish each line before touching another. Do not take a piece of the top line, and then a smaller piece of the line

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underneath; a letter of that underneath it again, and so on. This way of working is sure to cause pie. Clear away everything as you go on, every space, point, &c., before the word that comes next is taken up.

One or two words is quite sufficient to be taken between the fingers at once. The lines being upside down, they are read from left to right, like ordinary printed matter, but as you have to begin at the end of a line you have no connection between the words. If, for example, the line were, "He took up the pen," and you were composing, you might easily remember it; but in distributing, you would take up *the pen* first, then *took up*, and then *He*. One glance at the type should be sufficient, and this should be taken while the fingers are removing the portion from that which is in the left hand. If you get into the habit of looking repeatedly at the matter between the thumb and finger, you will lose much time, and involve yourself in much unnecessary trouble.

The portion held in the left hand whilst distributing is called a handful; although it may only consist of a few lines.

The second finger of the right hand should only be used for separating the types, in order that they may, when over the boxes to which they belong, fall into them. The thumb and the first finger are used rather to hold than to separate or disjoin the type.

Too large a handful is dangerous and inconvenient; it needlessly tries the wrist. Too small a handful involves waste of time in needless frequent lifting.

Never throw letters into the case with their faces downwards. Doing so batters the fine lines, and sometimes breaks off the seriffs. A careless compositor may in this way wear out the type, by the mere process of distributing, faster than if it were kept constantly printed under a cylinder.

Do not overfill the boxes, otherwise the case will get into pie. From time to time you will find a little heap of types accumulating in the middle of the boxes; level these by moving a little of the type into the corners. If cases

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are put away with great heaps in the middle of the boxes, or with the boxes too full, they are generally pied by letters getting into adjoining boxes. The types also run great danger of being broken, as it is so often necessary to place cases on the top of one another. For this reason the boxes should never be filled to a point higher than the tops of the bars.

If there is an excess of some particular sorts of type in the matter distributed, some of the boxes may get overfull, while others are nearly empty. To avoid this, remove the superabundance from time to time into another case, or into a fount-case,* or even tie it up in a parcel, marking on the outside what it contains. Try to keep the case as even as possible; that is, to keep a fair proportion of type in each box.

Take care also to keep the different kinds of spaces in their proper boxes. Some little consideration is necessary to do this at first, especially in regard to founts of small types, the difference between the middle and thin spaces of which, for instance, are so minute. Practice, however, will overcome this difficulty, and enable the compositor to know the character of a space at a glance. †

We do not know of any part of the business of a compositor in which he is so awkward at first as in distributing; nor is there anything about it which strikes a stranger so much as the dexterity that is acquired after practice. A competent, experienced compositor literally showers the types into their respective boxes. As he moves his hand over the boxes, it would appear as though

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* Fount cases are chiefly used in newspaper offices, where exceptionally heavy founts of type are required. The upper cases are generally 39 inches long by 16½ inches broad; and they are divided into 49 boxes for the capitals and figures with a few odd sorts. The lower cases are also 39 inches by 16½ inches in size; they have the same number of boxes as any ordinary lower case. The boxes in both cases are nearly two inches deep.

† Some printers mix all the spaces except the hair spaces; that is, put them all into the same box except the last. Others keep each space distinct in a separate box; others mix the thick and middle, and keep the thin and the hair spaces separate; thus three boxes are required for spaces. The more usual plan is to mix the middle and thin spaces, for in composing poetry, or any matter not consisting of full lines, it is disadvantageous to have thick spaces mixed with any other. Whatever may be the established rule in any office, the compositor is bound to follow

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he were dropping in the types at random, yet every movement is a designed one, and every type finds it proper place in the cases.

The ability to distribute correctly and expeditiously is an acquirement of great importance. Accuracy will reward a conscientious purpose to do the work well; speed will be acquired by careful practice, and a persistent endeavour to do it in the best way.

Various Hints.—Apprentices are sometimes put to distributing before they have learned to compose; sometimes even before they know the difference between such letters as p and q, small cap w and the lower-case w. The result is that the cases are got into a state of pie.

The letter board and galley should always be clean before the matter is placed on them for distribution.

Formerly compositors used often to keep a piece of alum in their cases, to counteract the slipperiness of the type. As this is caused by insufficient washing, the alum is quite unnecessary.

New type, when wetted, is apt to stick together very tenaciously, or to become "baked." This may be avoided by using a little soft soap in the water. The type, however, is often irretrievably damaged, after being only once used, by being struck against the stone to loosen it.

If letters fall on the floor (as they are very liable to do) during the process of distribution, they must be carefully picked up and returned to the cases. The quantity of type left on the floor and swept up, and consequently seriously injured, is, in many indifferently-managed offices, most deplorable.

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CHAPTER XXX.

RULES AND REGULATIONS OF THE PRINTING OFFICE—Constitution of the Chapel—Its Functions, as they affect Employers—As they affect the Members—Miscellaneous Rules for small Offices.

FROM time to time, as we have encountered terms relating to the inner economy of the printing office, we have explained their meaning, but only with reference to the subject-matter in hand. The relation of the terms to each other, and the system of management they imply, remain, however, to be described.

The necessity of rules and regulations in every printing office where more than one person is employed is obvious. But the full measure of the evils that can be developed in an office can only be learned by experience, and in the same way only can the necessary rules for their avoidance be laid down.

There are some evils which no laws can cure; such as idleness, inefficiency, carelessness, destructiveness. But others which arise may be easily suppressed if the regulations of the "house," as the printing office is termed, are properly understood and rigidly enforced.

The following rules are founded on those in practical working order in some of the oldest metropolitan offices. Even where they cannot be adopted altogether, they furnish many useful hints, and indeed require but little adaptation to the circumstances of any respectable office.

The Chapel.—The internal government of a printing office is best conducted by means of a "chapel." The chapel should consist of all the journeymen in the office. It is presumed that these will be of fair character, otherwise they would not be employed in the establishment; but the chapel has the right of refusing to admit any one who may be obnoxious to it. If the house is known as a "society house" none but society men are admitted to it. Apprentices in the last year of their time usually have the privilege of attending all chapels connected with trade matters, but not of voting on any question.

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The chapel may be viewed in a two-fold aspect. It has its fiduciary character, as the recipient of, and the medium for, conveying to the trade society the contributions of those who belong to it. It also has its executive character—settling disputes as they arise, and carrying out the law of the trade as settled by ancient usage. The general expenses of the chapel are defrayed by a payment from each member, of one penny or more per week, which amount has to be paid regularly with the society subscription. A small fine is usually imposed on every member, at the general monthly chapel, who is a month in arrear with his subscriptions to the chapel fund. The fines are rigorously exacted before any money is credited as subscriptions. Any default in the payment is left to be dealt with as the chapel may think fit.

How Chapels are called.—The chapel is simply a meeting of workmen who congregate round the imposing stone. The chapel is usually held in meal times; the tea half-hour being a favourite opportunity, as tea can be partaken of while the chapel is deliberating, and thus no time is lost. Any member may have a chapel called at any time by depositing a shilling with the father. Should it appear to the members that the circumstances are frivolous or vexatious, this sum is forfeited. But on a certain day in every month a chapel is usually called for general purposes. All the members must be present at the chapel. Persons not answering to their names when called at the opening, or absent during the whole chapel, unless by sanction of the father, are fined; but if a workman has to leave off work not less than an hour before the time specified for holding the chapel, he is generally held to be exempt.

The "Father" is the president of the chapel. He is usually elected in the first week of January in each year. It is his business to call all meetings of the chapel and to preside over them; to receive and answer all communications connected with the trade; and as he is considered to represent the chapel, it is his duty to head all deputations to "the closet," as the employers or their deputy or overseer are called, on any business connected with the trade.

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When a journeyman comes into the house, the father is required, within three hours after receiving notice of his arrival, to wait upon him and ascertain if he is a member of the society or trade union. For neglect of this duty the father is fined. The father, in consideration of performing all these duties, some of them of a very onerous and frequently of a very delicate character, receives a small annual salary, paid quarterly—two pounds per year being the amount in some offices.

Next to the father in importance is the "chapel clerk." This official is also elected the first week in January. He is entrusted with the collection of all moneys belonging to the society, and has to pay them over to the secretary of the trade society once a month. He acts, in fact, as agent of the general trade union. But besides these funds, he collects those that belong to the individual chapel, and has to disburse them in the manner agreed upon by the chapel. He has to keep certain books of accounts, which are carefully audited every month. He also has to keep the minutes of all chapels, records of decisions of cases referred to the union or trade committee, and all reports of delegate meetings of the trade society. For these services he is paid an annual salary; frequently about £3.

To act as a check upon the father and chapel clerk, two chapel auditors are elected, also the first week in January. They audit all the accounts of the chapel, and are paid a small sum (say one shilling) for each audit.

The introduction into the chapel of persons who do not satisfy the trade regulations is prevented by the surveillance of the clickers, who have to give notice to the father, within one day, of any strangers joining their companionships. In default the clickers are fined. When reported to the father, the new-comer has to show his credentials, &c., as already mentioned.

The chapel represents the office at the general councils of the trade by appointing a certain number of delegates; the number being fixed according to the number of hands employed in the establishment. All persons appointed to wait on the trade committee, or selected to attend delegate

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meetings of the trade society, receive a small sum (about 1s. 6d.) for each night's attendance.

Occasionally a committee is appointed to investigate some dispute that has been brought before the chapel. Each member of such committee should be remunerated for his services during such investigation, at a certain rate (say 8d.) per hour from the chapel fund. The expense so incurred has to be repaid to the fund by the party proved to be in fault, together with such fine as the chapel may think proper to inflict.

Let us now leave the chapel as it affects the men, and observe how it provides for the due order and regularity of the office, and thus legislates for the employer as well as the employed. It begins by limiting the working hours according to the hours observed in the house. For instance: "Any person working before eight o'clock in the morning, or between twelve and one (the dinner hour), or half-past four and five (the tea half-hour), or after seven o'clock in the evening, unless instructed to do so by the closet, shall be fined 6d." There is also a fine imposed upon any man striking another. Any member, however, desirous of bringing a complaint against another, has only to give the nature of the complaint in writing, with his name attached, to the father, when it is read over to the chapel assembled and duly adjudicated upon.

The principal evils which have to be provided against in a printing office are these:—

Mixing Founts.—Any person mixing founts without the permission of the storekeeper is fined 6d. Any person keeping extraneous sorts, such as half-fractions, Greek, italic, or any peculiar sorts, in his case, except those sorts which are in regular use, is liable to a similar fine.

Castings-up.—No person is allowed to proceed with the making-up of a work beyond three sheets without having first submitted the cast-up to the closet, or having obtained the permission of the father of the chapel for so doing. All castings-up, when approved, are to be entered by the clicker in the cast-up book, the penalty for the non-observance of this rule being 1s.

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Making-up.—No companionship is permitted to proceed beyond two-thirds of a work without having obtained orders from the closet to incur the charge of "no return." In default the clicker is fined.

Leaded Work.—Any person proceeding with a leaded work without being furnished with leads, unless ordered to do so by the closet, with the understanding that he will be paid for the time employed in leading out the matter, is fined. Any person proceeding with turned sorts without orders for the "turning" to be done at the expense of the closet, is liable to a further fine.

Taking Sorts.—Any person detected taking sorts; that is, type, leads, galleys, &c., from another's frame, without permission, or taking another's share of letter without his consent, is fined.

Leaving a Foul Stone.—Any person leaving type, furniture, corrections, boards, pages, &c., on an imposing-stone is fined, unless the materials are removed within ten minutes after a request is made to that effect.

Returning Sorts.—Any person requiring Greek, Hebrew, or any peculiar cases from the store-room, must return them on the completion of the work.

Distributing.—A fine is imposed for distributing a work composed by another companionship and neglecting to secure the heads, notes, &c.

Clearing Away.—All books and jobs when worked off should be cleared away within three days after notice has been given to that effect. Cap., small cap., and italic lines ought to be picked out and tied up separately. No packet, however, should consist of less than twelve lines.

Formes for Distribution.—All formes for distribution should be laid up and well washed on a board in the sink, or, if laid up in the composing room, should be taken in galleys to the sink, and thoroughly washed.

Furniture and Laying-up.—Should any companionship want only the furniture of a work that has been composed by another companionship, the latter should be required

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to lay up the formes within one hour of being requested to do so. When works, after being worked off, are kept standing and used for second editions, &c., all laying-up for furniture is done at the expense of the closet.

Throwing; Leaving Lights.—A fine is to be invariably imposed upon anyone throwing type, quoins, paper, &c., at another while in the office. Equally reprehensible is the practice of leaving the house at any time without extinguishing the gas.

It is a useful enactment that no questions shall be put to the vote that can be decided by the rules recognised in the office; and that no appeal should he heard from any member who has been fined, until he has paid his fine.

Apprentices.—All apprentices should be brought under the operation of the rules of an office, and have the protection afforded by them in every case in which they can possibly be brought to meet their position. On the occasion of any young man coming out of his time, he ought to wait upon the father, and inform him of the circumstance.

The General Bill.—Every clicker should be required to produce a general bill of every work or job he makes up, within a fortnight after it has gone to press.

All matters not provided for in the rules of the office ought to be dealt with at the discretion of the chapel. The rules should be printed, and every member of the chapel should be required to take a copy.

The following are some additional rules, and contain some provisions more applicable to small offices than the above:—

Compositors are to receive their cases from the storekeeper, his assistant, or the foreman, free from all pie or improper sorts, with clean quadrat and space boxes, both roman and italic. They must return their cases in the same clean condition.

When a compositor receives letter, furniture, &c., he is to return any portion not used in as good state as he received it, the same day, if possible.

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When a case is taken out of a rack, the compositor is to return it into the proper place immediately after he has done with it.

No cases should be permitted to be placed over others, on the floor or under the frames.

Compositors should be required to impose their matter, and pull a proof as soon as the matter is made up, unless directed otherwise, and to correct the proof without unnecessary delay.

The proof, when pulled, is to be given to the reader, or sent to such person as may be directed, the copy in regular order to accompany the first proof, and the foul proof the revise.

A compositor is not to detain an imposing-stone longer than the nature of the business may require.

Head-lines or other useful materials on galleys used during the course of a work should be cleared away as soon as the work is finished.

When a work is done, the compositor, before beginning another work, unless otherwise directed, should be required to clear away the formes, taking from them the head-lines, blank lines, and odd sorts, as well as the leads and reglets, which, with the furniture of each sheet, and the matter, properly tied up for papering, should be given to the store-keeper, or overseer, or foreman.

Sweepings of frames ought to be cleared away before a certain hour each day. Matter broken by accident should, whenever possible, be cleared away on the same day.

The saw, saw block, lead and rule cutter, bowl, sponge, letter brush, shears, bellows, &c., should be returned to their respective places as soon as done with.

Letter boards, window frames, case racks, &c., should be scrupulously kept free from pie.

Unnecessary conversation ought to be avoided. Singing, whistling, &c., should be rigorously prohibited.

The preceding rules embrace most of the exigencies which arise in ordinary offices. As already remarked, cases will occur which no rules could anticipate, and these,

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if they affect the closet, are best left to the overseer or to the firm, or if they are connected with the mutual relationship of the men themselves, are best left to the arbitration of a chapel.

A good overseer, firm, just, and judicious, is a necessary adjunct to any code of regulations. The best rules may be evaded, and even distorted from their obvious intentions, if they are not interpreted in a sensible and equitable manner.

Many offices have special prohibitions which need not here be specified. Thus, in some establishments the compositors are allowed to send out the boys for refreshments, &c., during the hours of working. In others this is strictly forbidden under pain of dismissal. In some, the potman is allowed to come in at certain hours and take orders for beer, &c. In some a "coffee man" is allowed to call and take orders for non-intoxicating beverages, eatables, &c. These are points that must be left to the individual discretion of employers. We would caution all who are concerned, however, against the laxity that usually sets in after ordinary working hours, and during the time that is allowed as overtime. In very good and strict offices (during the day time) smoking, tossing, and drinking are often practised with impunity at night, owing to the connivance of the overseer, and the absence of any member of the firm.

Many apprentices are demoralised by being compelled by the journeymen to run certain errands to the public-house, &c. Apprentices ought never to be permitted to do such errands. There is usually someone in the establishment who can be entrusted with such commissions, without destroying his sense of self-respect, or wasting the time he ought to spend in learning his business.

In very few offices, indeed, can the whole of the preceding rules be acted upon in their entirety, but all may act upon their spirit, and prevent in one way or another the evils that they are intended to repress. The rules, we should say, are nevertheless thoroughly practicable, and some of them have been in operation in old-established offices during the last half-century.

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It may be useful here to include a system of timekeeping as adopted in a large metropolitan office.

All new hands should be distinctly informed as to the regulations of the office at the time of their engagement. If this be not done, unpleasantness may afterwards arise; indeed, the absence of this proper precaution and mutual understanding has resulted in several misunderstandings and law-suits.

The new employé should be told by the employer or his deputy the overseer, what "the rules of the house" are on the following points:—

1.—Office hours.
2.—Meal-times.
3.—Closed days.
4.—General holidays.

It might, however, be sufficient if a printed notice setting forth the regulations were prominently exhibited in each department of the office.

Office Hours.—These differ in the case and in the machine department. The following hours are recommended, as experience in large establishments has shown them to be convenient. They also meet the customs sanctioned by the Compositors' Union and the late Master Printers' Association:—

I.

Case Department.—All closed days and holidays will be deducted. Hours of work are as follows, until further notice:—

Monday	8	till	12	1	till	7
Tuesday	8	,,	12	1	,,	7
Wednesday	8	,,	12	1	,,	7
Thursday	8	,,	12	1	,,	8
Friday	8	,,	12	1	,,	7
Saturday	8	,,	11	11½	,,	2

(Address)..... By Order.

(Date)..... .....

In this case the extra hour on Thursday has been adopted to meet the requirements of weekly papers, which are "closed up" and go to press that evening.

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II.

Machine Department.—All closed days and holidays will be deducted.

Hours of work are as follows, until further notice:—

Monday	8	till	12	1	till 6·30.
Tuesday	8	,,	12	1	,, 6·30.
Wednesday	8	,,	12	1	,, 6·30.
Thursday.....	8	,,	12	1	,, 7
Friday	8	,,	12	1	,, 6.30.
Saturday	8	,,	2 (without lunch).		

No tea time is allowed.

III.

Meal Times.—The meal times in this house are as follows:—

Dinner	12.	0	till 1
Tea	4.30	,,	5

Luncheon time is abolished.

No person is allowed to send for or bring in refreshment, except at the times above indicated.

Disregard of this rule will entail dismissal.

(Address)..... By Order.

(Date)..... .....

It will be seen that according to this arrangement the machine department is closed half-an hour earlier than the case department. This is to avoid stoppage for tea, and the loss of time thereby caused by washing up, &c.

Closed days usually amount to *six* in the course of the year:—

Christmas Day.	Whit Monday.
Boxing Day.	Good Friday.
Easter Monday.	Wayzgoose Day.

The magistrates and county court judges have on several occasions decided that "closed days," according to the custom of the house, are not to be paid for. Before 1872, however,it was often customary not to deduct closed days.

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Timekeeping by Tickets or Checks.—It is usual to require both piece and stab hands to conform to the hours of attendance as set forth in the previous forms.

The wages or earnings of piece hands will be ascertained by means of "docs." (documents). Those of stab hands will be according to time worked, and it is ascertained in two different ways.

1. Each man as he passes the timekeeper morning and afternoon takes from a board a metal ticket bearing a number. On entering the office he deposits his ticket in a box, as an evidence of his having gone to work. When all the hands have passed through, the tickets are examined, and each person corresponding with the number is credited with half-a-day's work. Afterwards the tickets are again hung on the board ready for the following attendances of the hands.

At the end of the week is made up the account of time lost, in the

TIMEKEEPER'S BOOK.

Time Lost.

NAME.	Mon.	Tues.	Wed.	Thur.	Fri.	Sat.	TOTAL.
	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.

As this only gives the time lost by the hands coming late or losing half days, &c., it is necessary that it should be supplemented by an account of the overtime, which is kept by the foreman or overseer.

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OVERSEER'S TIME BOOK.

Week ending.....

NAME.	Overtime.						Total.	Time Lost.						Total.	Balance.	
	M.	T.	W.	Th.	F.	S.		M.	T.	W.	Th.	F.	S.		To good	To bad.

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When this account is made up, it shows the time to the credit or debit of the week's work.

Lost time is deducted from overtime at the same rate; although it may consist of time that would not be paid for at the higher rate of overtime. Full time must always be made up before any overtime is allowed. A man losing three hours, for instance, during the week, and making three hours' overtime does not receive anything beyond the ordinary week's wages.

JOB-WORK.

In some houses the hands are required to send in a separate ticket showing the time occupied by each job. In others a daily ticket only is written, showing the time devoted to the various jobs which have been done within the day. Each job is numbered. The following is the form used:—

This Ticket to be delivered to the Overseer every morning at — o'clock.

Name ..... *Date*.....

Overtime.....hours. Lost time.....hours.

No. of Job.	Name and Description of Job.	Time.	Cost.		
			£	s.	d.
	Distribution.....				

After checking the items, the overseer enters the charges in his own book, which forms the foundation on which the ultimate calculation of cost is based.

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OVERSEER'S JOB-BOOK.

No. of Job.	Date.	Name and Description of Job.	By whom done.	Time.	Over-time.	Stereo-typing.	Total Cost.			Charge.			Proofs.

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This form is only applicable for job-work. Book-work, as will be shown hereafter, is entered on a different system.

CHAPTER XXXI.

Customs of the Trade—Affecting Apprentices.

Besides the *laws* directly bearing upon printing, there are *customs* in the trade regulating its practice, which, being generally recognised, have received legal sanction and approval. We are not aware of any attempt, hitherto, to collect these together, or to epitomise the judicial decisions founded upon them. These customs are, however, most important to the printer, whether employer or employed; and ignorance of them results frequently in serious loss, useless litigation, ill-feeling, and discontent.

In treating this subject, we propose first of all to state the custom, and then to cite some illustrative case exemplifying its action, or the effects of non-observance of it.

Apprentices.—In the printing trade there are two kinds of apprentices, indoor and outdoor. The first-named are understood to be lodged and maintained by the master in his own dwelling-place. This is only the case now in a very few instances, and chiefly done by very small employers. Some of the large offices, however, have dwelling-houses connected with them in the immediate neighbourhood, where the apprentices reside under the charge of a matron. Outdoor apprentices, on the other hand, live with their families or friends, and receive a certain remuneration in lieu of their maintenance. If a sum of money be paid to the master in consideration of his teaching the boy his trade, it is known as a *premium*.

Term of Apprenticeship.—This has always been fixed at seven years in the printing trade. No one is eligible to become a member of the trade society unless he has fully

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completed this term. If a youth "run away," as the phrase is, from his master, he may be brought back and compelled to finish his servitude, however long he may have absented himself. Thus, at the Bow-street Police Court (1874) a printer's apprentice was brought up for not completing his time. He had absented himself for sixteen months, and gone to America. Counsel pleaded, among other things, that the wages named in the indenture had not been paid. It was shown, however, that the boy had been paid "on piece," and earned more than the stipulated wages. The magistrate decided that the apprentice must go back to his employers, and make up the full term of his apprenticeship.

Boys may, however, be legally bound for a less term than seven years; and if they do not fulfil their covenant they are equally liable to punishment. This term is sometimes agreed upon, but is not generally recognised.

At the Westminster Police Court (1874), an apprentice was summoned for absenting himself from his employment, thereby entailing considerable expense and inconvenience to his master. The latter said that the prisoner was apprenticed to him for five years and had served two and a half years. He had no premium with him, and his wages at that time were 10s. per week and overtime. He had absented himself a month before, and never returned. On inquiry it had been found that he had been working at another office. The prisoner was fined £5, or one month's imprisonment.

Servitude after coming of age.—This is a point upon which much error exists in the printing trade. Boys are usually indentured, or "bound," at fourteen years of age, and so complete their apprenticeship, or "come out of their time," at twenty-one. After a boy has obtained his majority, he cannot be compelled to work as an apprentice, even though his seven years' servitude have not expired. The law on this point, however, is that the surety who signed the articles of indenture is liable to indemnify the employer for his loss of service occasioned by the boy's not fulfilling his stipulated term. Several cases have come before the courts which bear on this subject. A case illustrating this obligation was heard in the

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Sheriff's Court, London, in 1876. The plaintiff, the employer, a printer and publisher, claimed compensation from the father of an apprentice who had absented himself when he came of age, believing that he was not liable to serve any longer. He was apprenticed for seven years, and was to be raised 2s. a week wages, viz., from 6s. to 18s., which latter sum was to be paid in the last year of the term, which would not expire until about two years after he became of age. He was, at the time of going away, worth forty shillings a week to his employer, and the latter brought the action to vindicate his rights and to show other apprentices that they could not absent themselves after agreeing to serve him. The defendant, the apprentice's father, said he was a poor man and could not pay damages. It was much against his wish that his son had left, but being of age he considered that he had no control over him. The under-sheriff told him he was liable by joining his son in the indenture, and must abide by the default of the latter to serve. The jury assessed the damages at £15.

An action was brought by a youth in the City of London Court, in 1874, for a fortnight's wages claimed to be due to him through having been discharged from the service of a City firm of printers without the customary fortnight's notice. The plaintiff had been bound to another firm for seven years, and left their employ the day he attained his majority, although there remained several months to complete the term of his indentures. He went to the defendants, another firm of printers, and obtained work as a journeyman, but when they learned the facts of the case they discharged him immediately—hence the action. The London Society of Compositors had, it appeared, recognized the plaintiff as a qualified compositor. The judge said that the plaintiff had done wrong in representing himself as a compositor, not having served his full time, and the society was wrong in giving him the status of a journeyman before he was entitled to it. The defendants were quite justified in discharging him at once, as they would otherwise have rendered themselves liable to an action for harbouring another man's servant.

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An impression seems to prevail among a certain class of apprentices that if they cannot support themselves on the wages received from the master to whom they are indentured, they have a right to go elsewhere to work. At Guildhall, 1875, a boy was brought up who was bound to a City firm of printers, for leaving their employ before he had served out his apprenticeship. The defence set up was that the boy could not keep himself on the wages earned, about ten shillings per week, and could get more by working for others. The Alderman who presided explained to him that his mother and adult brother had covenanted to support him, and that, practically, he had no defence. The summons was adjourned for a fortnight, on the understanding that the boy would return to fulfil the terms of his indenture; or in default be committed to prison. The prosecutors expressed their intention, in future, of summoning any employer who harboured a runaway apprentice.

Misconduct during the term of serviture.—A master has several modes of administering punishment and enforcing obedience to his orders. He may inflict corporal punishment to a moderate degree if the apprentice be under age; but he may not empower his overseer or any of the workmen to do this. The better course, and that most frequently adopted in the printing trade, is to bring the apprentice before a magistrate, to be by him punished. The master may also bring an action against the parties who signed the indentures and thereby covenanted for the boy's good conduct. The magistrates have the power of cancelling the indentures when no premium is paid, or the premium is under £25. The master by himself is not able to discharge an apprentice, but he is not liable to maintain the youth, if his conduct be such that he cannot control him.

At the Clerkenwell Police Court, in 1876, an employer, a letter-press printer, appeared in answer to a summons to show cause why he unlawfully cancelled the indentures of an apprentice. The complainant was apprenticed to the defendant and his partner for seven years; complainant and his father and defendant and his partner being

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all parties to the indenture. Complainant's father had since died, and in consequence of complainant repeatedly "larking" in the shop, his employer told him he would give him his indentures, and accordingly did so, writing across the back of them, "The within-named indenture is cancelled by mutual consent." Defendant and complainant signed the same, and defendant found complainant another master, but instead of earning the same wages he only earned about one-half, and he now wished to go back and serve out his apprenticeship. The magistrate said that although an infant could bind himself, it being for his benefit, yet he could not dissolve the indenture, and was bound to serve out his apprenticeship. The magistrate had power to do so, but not the apprentice. Here was an endorsement signed only by two parties out of the four to the indenture, and in law it was no cancellation, and must be treated as a nullity. He would hear the master, however, as to the grounds upon which he desired to get rid of the boy. The master detailed various acts of insubordination, such as throwing things about, injuring type, &c. The magistrate said these were not sufficient grounds for him (the magistrate) to cancel the indenture, and the complainant must go back into the service of the defendant. If the master had any future cause of complaint he could bring the apprentice to the court; meanwhile, he ordered him to attend at his work the following morning.

A case showing the application of this remedy was heard at the Borough Police Court in 1877. An apprentice to a firm of letter-press printers was brought up under the Employers and Workmen Act, for absenting himself for ten days from his employment. He had served four years of his time, and was in receipt of nine shillings a week wages. For some time previous he had been very irregular in his attendance; he should have come to his work at eight in the morning, but seldom arrived before nine, and that caused considerable inconvenience. The defendant admitted being late on several mornings; on the last morning before keeping away he had been sent home. It was explained that the timekeeper had orders not to

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admit him until ten o'clock. The magistrate fined the apprentice ten shillings and costs, and ordered him to return to his work.

Another case showing the responsibilities and rights of employers and apprentices respectively was heard at the Guildhall Police Court in 1877. An employer was summoned for refusing to employ the complainant, his lawfully-bound apprentice. The latter was bound to the defendant in the previous year, but after serving for a month or two, the defendant dismissed him and refused to give him any more employment. It was contended that the complainant had misconducted himself, and in consequence the defendant was entitled to cancel the indentures. The Alderman presiding said that if the complainant had misconducted himself, he should have been brought to the court, where the question of cancelling the indentures could be discussed. It was pointed out that an interested party in a case could not be made the judge where his own interests were concerned. There was nothing in the case that left him (the Alderman) any alternative but to make the order for the defendant to take the apprentice back and teach him his business.

At Worship-street, in 1874, a firm of printers were summoned by one of their apprentices for refusing to teach him the trade and business of a compositor according to the terms of the apprenticeship. The apprentice was also summoned by the firm for having misconducted himself as an apprentice. The evidence showed that, in consequence of some "larking" going on, the boy was ordered off the premises, and told not to come back. The employers afterwards refused to employ him, although there was a long term of his apprenticeship to be served. The masters had offered to cancel the indentures, but the parents refused. The masters contended that they could not have so unruly and mischievous a boy back. The boy admitted he was in the habit of practical joking, leading the men to join in the larking, and so losing their time. The boy, it was stated, had once been sent home as a caution for similar misconduct, but never fined. The magistrate thought that the employers might have

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tried the effect of that course upon the lad and then brought him before the Court, instead of waiting till they were summoned. The employers said they had determined never to have anything more to do with the lad, whatever the Court might order. The magistrate said it was unnecessary to tell the employers what their rights were; they knew that the boy could have been summoned and punished for his misconduct, but certainly they were not entitled, with only the warning given by the fact of their having sent the boy home once before, to say that they would throw him aside altogether, and not allow him in their service again. The misconduct of the boy was not denied, and he would have to pay a fine of twenty shillings and costs. The employers were ordered to fulfil the contract, and to find two sureties in £25 each for the due carrying out of the same. In default of obeying that order and paying costs, there would be imprisonment for fourteen days.

Damages wilfully done to printing machinery and plant are punished by the magistrates or justices of the peace.

At the Southwark Police Court, 1873, a machine boy was summoned for damaging a forme of type by striking it with a piece of iron, whereby the face of the forme and the rules were broken, the loss being serious. The foreman said that boys had previously damaged type in a similar way in order to play while the formes were being repaired. The magistrate doubted whether he ought not to send the defendant to prison for a long period; but eventually determined, for that time, to fine him £4 and costs.

An apprentice was brought up at Bow-street Police Court in 1873, and sentenced to one month's imprisonment, for having wilfully destroyed the property of his master. It appeared that the defendant and another boy had a spite against their master, in whose office a strike had some time previously occurred. The office not being a society office, the apprentices could not be called out. The defendant had opposed that greatly, and in consequence of his behaviour he was not allowed so much extra money as was generally given to apprentices by way of encouragement if their conduct was good. He had deliberately taken up an

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advertisement in type and thrown it on to the roof of the next house. The boy pleading that he only did this out of mischief, the magistrate was induced to discharge him with a caution.

At Bow-street Police Court, 1873, a boy was charged with wilfully damaging, to the amount of five shillings, type belonging to his master. Another boy saw him strike the type with a hammer three or four times. When given into custody of a police officer, the defendant made light of the matter. The magistrate sent him to prison for six weeks' hard labour.

A machine boy was brought up Marlborough-street Police Court, in 1874, charged with placing a stone in a printing machine with intent to damage the same and render it useless. The employer said that such acts were done out of sheer mischief, and so that the boys might get an extra rest. The magistrate said that there was a difficulty in dealing with the case. If the person had done damage to the extent of one farthing he could have punished him, but he was detected before he had done any damage. He would have to discharge the prisoner and grant a summons under the Masters and Servants Act for aggravated misconduct.

Two machine boys were charged at the Clerkenwell Police Court, in 1877, with being concerned together in wilfully damaging an electrotype plate to the value of twenty shillings. The defendants admitted taking a piece of iron and rubbing it on the plate. They were each fined five shillings, and the amount of the damage, twenty shillings, or in default fourteen days' hard labour.

At Bow-street, in 1877, a machine boy was charged with wilfully damaging a newly-repaired double platen machine. He had placed a bolt in the machine, saying that he would stop it and get a "mike" (a slang term for an interval of idleness), telling another boy "he would probably see a smash up." The machine-minder said that the damage was discovered, but not until after the machine had been injured. Although the father of the boy gave him a good character, he was sentenced to one month's imprisonment with hard labour.

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Turnover Apprentices.—An apprenticeship may be determined or ended by mutual consent of the partner to the indenture. The bankruptcy of the master puts an end to the contract at once. The Bankruptcy Court, however, may order any sum to be paid out of the bankrupt's estate in consideration of the premium paid by the apprentice. An end is also put to an apprenticeship by the death of the master, for the apprentice does not go to the executors to finish his term.* When the apprentice is bound to two masters, on the death of the one he must continue his servitude to the survivor.

An apprentice whose term has been determined in any one of the ways already mentioned, and is passed over to another master to finish his term, is called in the printing trade a "turnover apprentice."

In a certain class of offices boys are put to the business and not bound. After serving three or four years, or perhaps less, if the master thinks it to his interest to part with them they are sent adrift; or if they think it to their own interest to part from him they leave his employ. They usually go to other offices, and work at a rate below journeymen's wages, but much above those of apprentices. This system is doing great harm to the printing business. It encourages the admission into the trade of boys who are not suited to it; due care is not taken in their selection, masters knowing that they can be discharged at any time. It does away with the control and discipline which is so important to masters and so valuable to the boys, as they can leave the office whenever so disposed. It tends to turn out incompetent and insufficiently experienced workmen. To encourage this system, is, in reality, short-sighted policy on the part of employers. After teaching a boy his trade and paying him wages at the same time, the employer has a right to expect his due return in the shape of the saving to be made during the last two or three years of the boy's time, when he ought to be worth a journeyman's wages.

An employer who, knowingly, or without making

* In the City of London, by an ancient custom, the executor is bound to put the apprentice to another master of the same trade.

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sufficient enquiries, engages an apprentice who has been bound to another master and has not completed his legal term, is liable to be called upon by the first employer for damages which he may have sustained by the loss of the boy's services.

The London Society of Compositors has a salutary rule on the subject of "turnovers," as follows:—

"That all persons known by the name of 'turnovers' shall be rebound to an employer by means of a legal or written witnessed agreement within a period of one month from entering an office; and unless this agreement be produced at the completion of their servitude, they shall not be admitted to this society without the sanction of the committee."

Payment of Apprentices.—Formerly it was considered sufficient if the master provided his apprentice with food and lodging, and necessary wearing apparel; but now three different systems are adopted for the remuneration of boys during their servitude. Indoor apprentices get a small wage in addition to their maintenance. Some outdoor apprentices get a progressive salary, beginning at five shillings a week or thereabouts, according to the prevailing rate of wages in the district, and rising one or two shillings per week each year, until they reach a maximum sum in the last year of their time. Others receive a small wage for the first year or two, and are then put on piece, receiving one-fourth, one-third, or one-half the amount they would earn if they were journeymen. It will be seen from a case already cited, that although in the indenture there may be a covenant to pay a certain stipulated sum, the fact of a boy being put on piece wages does not invalidate the covenant, provided he earns more than the specified wage.

Apprenticing to different branches of the Printing Business.—A boy is generally indentured in the country, where journeymen work both at press and case, to "the printing trade," which includes composing and press-work. In London he is generally apprenticed to one of these branches only, and cannot be put to work of a different character. Although we are not aware of any legal decision having yet been given on the subject, we believe that

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"press-work" now includes machine work. If a boy be apprenticed to machine work, it is very important that his parents or guardians should stipulate for some experience at press, otherwise he will never become a thoroughly efficient workman.

Bonuses to Apprentices.—Several of the large London printing houses are adopting the excellent plan, for many years pursued in Germany and France, of offering a certain sum of money, such as £20, as a bonus to apprentices who have conducted themselves satisfactorily during their period of servitude. Although this is essentially in the nature of a gift, we mention it here in order to commend the custom to employers. A sum like this ought to be of great value to the youth at that crisis of his life when he is freed from servitude and becomes a journeyman. On the other hand, a boy who has done his best for his master's interests during his seven years' apprenticeship will have saved him much more than the amount concerned.

It is much to be regretted that in this country we have no schools of technical education for apprentices, such as are found on the Continent. These not only make the youth more efficient and valuable to his master, but interest him in his business, thereby relieving his daily occupation from that sense of drudgery which is so harmful. We hope earnestly that before long something will be done to supply this great want in this country.

Greater care ought undoubtedly to be taken in the selection of boys for apprentices to the printing business. The present system of "pitchforking" boys into printing is altogether opposed to the best interests of the trade. A number of boys are introduced who will never be craftsmen, or skilled workmen; they are mentally incapable of becoming so. When out of their time they will only drag out a miserable existence by precarious employment, as no master will keep them any longer than he can help. The qualifications which ought to be required in every boy desirous of being apprenticed are, that he should have had a fair education; that he is a good speller; has a turn for reading; and that his eyesight is good. He should be

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particularly enjoined to be punctual, obedient, and courteous.

A trade journal very truly says:—"Apprentices should feel that they are engaged at a craft which is to furnish them with a livelihood for years to come, and that it is one in which they should have a deep personal pride, as a profession beyond comparison with all others. They should be taught that the printing office offers better opportunities for the accomplishment of good and the attainment of honour than any other school they may enter; but these opportunities are only for those whom nature has endowed with brains, and pluck to seize and hold on to them. Indolence and shiftlessness have no use for them."

Limitation of Apprentices.—In all "society" offices there is a limit set to the number of apprentices who may be employed. The limit varies in different districts, but the following is generally followed:—"No office shall be deemed fair where there is a greater number of apprentices than two, unless four members of the society (journeymen) be regularly employed, when the number may be increased to three; but on no account shall any office have more." "No new establishment for a weekly or other newspaper shall be allowed to take an apprentice until such paper shall have been in existence twelve months."

Out of his Time.—We will suppose that the youth has faithfully served his seven years' apprenticeship, with honour to himself and to the satisfaction of his employer. He is now "out of his time." Formerly a number of old customs—much more honoured in the breach than the observance—were in vogue on this occasion, such as the singing of the "Cuz's Anthem" (see *Gentleman's Magazine*, vol. x., p. 239) and "Washing" (See "Southward's Dictionary," *sub voce*, "Out of his time.") At the present time (although we have ourselves witnessed a washing ceremony in an office in the City of London) the usual thing is to get up a supper, to which the men and apprentices in the office are invited, in honour of an apprentice becoming a journeyman. Frequently the overseer and employer are also invited and are present.

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CHAPTER XXXII.

PRICES OF COMPOSITION in London and the principal Provincial Towns.

BOTH in London and in the country, compositors are paid under two different systems, known respectively as 'stab—a contraction of "establishment"—wages, and piece work.

Under the first, the men are required to work so many hours in the week, and at the end they receive a certain fixed and understood wage. Under the second, they are paid according to the amount of work done, calculated by a certain scale to be given hereafter.

The custom in regard to the scale has become so well established, that in all so-called "fair" offices, or offices conforming to the regulations prescribed by the trade societies, if a man be engaged without (as is usually the case) any arrangement being made about his wages, he, as well as his employer, understand perfectly well the exact sum that will become due to him at the end of the time or the job, and the rate of payment on which is founded this understanding is recognised by the various courts for the recovery of debts.*

* For upwards of a hundred years—that is, ever since the date of the earliest documents on the subject that have been preserved—a uniform custom has prevailed in the London printing trade for the settlement of the rate of wages. This is by conference between a selected number of employers and of workmen. The first scale of prices was agreed upon in 1785, and eight years after a conference of masters and men took place, when that scale was modified. In 1800 an advance took place; in the following year the first trade society was established, "to correct irregularities and to bring the modes of charge from custom and precedent into one point of view, in order to their being better understood by all concerned." Previously, the compositors made known their wants and grievances by signing "documents." In 1805, an arbitration committee, composed of eight masters and eight men, was duly authorised by their respective bodies to frame regulations for the future payment of compositors' work. The result of the labours of this committee has been the basis of charges up to the present time. A scale was made which, in 1810, was slightly altered. Six years after, a reduction upon reprints was made. In 1834, an explanatory commentary was appended to the scale; subsequently, an appendix was added. The publication containing these documents is known as the "Green Book,"

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If, on the other hand, the office is not a "fair" one, no rate is implied in an engagement, and it is for the workman to ascertain the scale adopted in the house, or to make his own arrangement with the employer; otherwise, whatever sum the latter may offer for his labour may have to be accepted, provided it be reasonable.

It is impossible, therefore, to set out the prevailing rates of any offices that are not "society" offices. As a general rule, their prices are below the others; but in London and elsewhere there are a few large firms whose terms are sufficiently liberal that, while not binding themselves by the regular scale, their men are enabled, owing to the character of the work upon which they are engaged, to earn very good wages, although in no case equal to what they would receive if their work were paid strictly in accordance with scale.

In the London trade, and in that of most of the large country towns, there are two kinds of establishment wages, corresponding to the two departments of news-work and book or job work.

News work, again, is divided into weekly news, daily morning news, and daily evening news.

Another modification of the 'stab scale is dependent upon the hours between which the daily period of work is comprised, and brings in the question of "overtime."

A still further modification is occasioned by the fact of the work being done on Sunday.

The regulations under each of these headings will now be summarised.

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from the colour of the wrapper. In 1847, further modifications of the scale were effected by consultation between representatives of the two parties concerned. In consequence of a memorial drawn up by the compositors, a committee of master printers and compositors sat in 1866, and mutually agreed upon further alterations. In 1872, what was called the "Settlement" was in a similar manner effected; and this is the legal scale at present in operation. Some minor alterations have been made subsequently. The result of these mutations is that the "Green Book" is of a very fragmentary character, and reference has to be made from page to page to ascertain how any item has been affected by subsequent legislation. We have, therefore, endeavoured to present a digest of the whole—excluding those points that are obsolete, and stating, with explicitness, the actual prices of the present day.

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ABSTRACT OF THE SCALE AS RAISED BY THE SETTLEMENT OF 1872.

MANUSCRIPT.

PER THOUSAND ENS.		COMMON.	FOREIGN.	DICTIONARIES.			GRAMMARS, &c.			GREEK.	
				English	English and Foreign	Foreign	English	English and Foreign	Foreign	Without Accents.	With Accents.
		d.	*d.*	*d.*	*d.*	*d.*	*d.*	*d.*	*d.*	*d.*	*d.*
English to Brevier	*leaded*	$6\frac{3}{4}$	$7\frac{1}{4}$	$7\frac{1}{4}$	$7\frac{1}{2}$	$7\frac{3}{4}$	7	$7\frac{1}{4}$	$7\frac{1}{2}$	$9\frac{1}{2}$	11
	solid	7	$7\frac{1}{2}$	$7\frac{1}{2}$	$7\frac{3}{4}$	8	$7\frac{1}{4}$	$7\frac{1}{2}$	$7\frac{3}{4}$	$9\frac{3}{4}$	$11\frac{1}{4}$
Minion	*leaded*	7	$7\frac{3}{4}$	$7\frac{1}{2}$	$7\frac{3}{4}$	$8\frac{1}{4}$	$7\frac{1}{4}$	$7\frac{1}{2}$	8		
	solid	$7\frac{1}{4}$	8	$7\frac{3}{4}$	8	$8\frac{1}{2}$	$7\frac{1}{2}$	$7\frac{3}{4}$	$8\frac{1}{4}$		
Nonpareil	*leaded*	$7\frac{3}{4}$	$8\frac{1}{4}$	$8\frac{1}{4}$	$8\frac{1}{2}$	9	8	$8\frac{1}{4}$	$8\frac{3}{4}$		
	solid	8	$8\frac{3}{4}$	$8\frac{1}{2}$	$8\frac{3}{4}$	$9\frac{1}{4}$	$8\frac{1}{4}$	$8\frac{1}{2}$	9		
Ruby	*leaded*	$8\frac{1}{4}$	9	$8\frac{3}{4}$	9	$9\frac{1}{2}$	$8\frac{1}{2}$	$8\frac{3}{4}$	$9\frac{1}{2}$		
	solid	$8\frac{1}{2}$	$9\frac{1}{4}$	9	$9\frac{1}{4}$	$9\frac{3}{4}$	$8\frac{3}{4}$	9	$9\frac{1}{2}$		
Pearl	*leaded*	$8\frac{3}{4}$	$9\frac{1}{2}$	$9\frac{1}{4}$	$9\frac{1}{2}$	10	9	$9\frac{1}{4}$	$9\frac{3}{4}$		
	solid	9	$9\frac{3}{4}$	$9\frac{1}{2}$	$9\frac{3}{4}$	$10\frac{1}{4}$	$9\frac{1}{4}$	$9\frac{1}{2}$	10		
Diamond	*leaded*	$10\frac{3}{4}$	$11\frac{3}{4}$	$11\frac{1}{4}$	$11\frac{1}{2}$	12	11	$11\frac{1}{4}$	$11\frac{3}{4}$		
	solid	11	$11\frac{3}{4}$	$11\frac{1}{2}$	$11\frac{3}{4}$	$12\frac{1}{4}$	$11\frac{1}{4}$	$11\frac{1}{2}$	12		

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REPRINT.

English to Brevier	*leaded*	6	6½	6½	6¾	7	6½	6½	6¾	8¾	10½
	solid	6¼	6¾	6¾	7	7¼	6½	6¾	7	9	10½
Minion	*leaded*	6¼	7	6¾	7	7½	6½	6¾	7¼		
	solid	6½	7¼	7	7¼	7¾	6¾	7	7½		
Nonpareil	*leaded*	7	7¾	7½	7¾	8¼	7¼	7½	8		
	solid	7¼	8	7¾	8	8½	7½	7¾	8¼		
Ruby	*leaded*	7½	8¼	8	8¼	8¾	7¾	8	8½		
	solid	7¾	8½	8¼	8½	9	8	8¼	8¾		
Pearl	*leaded*	8	8¾	8½	8¾	9¼	8½	8½	9		
	solid	8¼	9	8¾	9	9½	8½	8¾	9¼		
Diamond	*leaded*	10	10¾	10½	10¾	11¼	10½	10½	11		
	solid	10¼	11	10¾	11	11½	10½	10¾	11¼		

Reprint with MS. insertions adds ¼*d.* to the price stated above.
Stereotyped matter with high spaces adds ¼*d.* to the price stated.
Stereotyped matter with low spaces adds ½*d.* to the price stated.

Notes constituting the charge of One Shilling per Sheet:—

4to. and 8vo....20 Lines or 2 Notes, and not exceeding 4pp. in every 10 Sheets.
12mo..... 1 Page or 2 Notes, and not exceeding 10pp. in every 10 Sheets.
18mo. or above... 2 Pages or 2 Notes, and not exceeding 8pp. in every 10 Sheets.
Pamphlets.....10 Lines or 2 Notes, and not exceeding 2pp. in every 5 Sheets.

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London Prices for Book and Jobbing Work.—The minimum establishment wages are 36s. per week of fifty-four hours. The apportionment of the fifty-four hours is mutually agreed upon between the employers and the journeymen in each office, the ordinary working hours, however, being from 8 a.m. to 7 p.m. from Monday to Friday (with an hour and a half for meals) and from 8 a.m. to 2 p.m. on Saturday.

Overtime.—A Compositor, whether on piece or 'stab, if working overtime, is entitled to 3d. per hour extra for all work done between the ordinary time of closing an office, and 8 a.m. of the following morning, provided, also, that overtime commences, under any circumstances, at 8 p.m.

Sunday Work is paid for at the rate of 6d. per hour extra, but in no case can a man receive less than 2s. 6d. extra.

In a previous chapter we have described the system of payment founded on the 1000 ens; and have shown how many thousand ens in different bodies run to the ems in pica measure. With these explanations the accompanying general table will be perfectly intelligible. It shows the rates of payment as settled in 1872, since when no alterations have been made.

In casting up pages, the heads, whites, and signature lines are included; and a thick space reckoned as an en in the width, and an en reckoned an em in the length of the page.

Where the number of letters amounts to 500, a charge is made for 1000; if under 500 no charge is made. An odd threepence in the amount of the bill is suppressed; above threepence is charged sixpence. Em and en quadrats, or whatever is used at the beginning or end of lines, are reckoned and charged for as an em in the width.

Bastard founts—that is, founts of one sized face cast on to the body of another, if of one remove, are cast up to the depth and width of the two founts to which they belong.

For convenience sake, we may arrange the charge for miscellaneous kinds of work alphabetically, as follows:—

Advertisements, when standing, or stereo blocks, if equal to one or more complete pages, in the wrapper or

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advertising sheet of a magazine are not chargeable; the compositor only charges for his time in making them up. The remainder of the matter in such a sheet, including standing advertisements not forming a complete page, are charged by the compositor.

Algebraical and other mathematical works, consisting of mathematical fractional workings numerously interspersed throughout are paid double the price of common matter. When such are numerous they only are cast up double, and the remainder as common matter.

Appeal Cases are cast up 8d. per 1000; if above 40 ems pica in width, at 9d. per 1000. Side notes, whether heavy or light, are paid per sheet of 4 pp. folio, if on a broad quotation, 3s.; double narrow, 5s.; double broad, 6s.

Blank Tables are cast up double the price of the text type of the work.

Blank Pages may be filled up at the option of the author; the compositor charging for his previous trouble in making up the blank.

Booksellers' Catalogues (in whatever language) are cast up at 8d. per 1000; not including the numbering (that is, the loss of time occasioned by supplying or correcting the numbers).

Borders round Pages.—Such works are cast up according to the actual dimensions of the type, an extra price being paid for the borders or rules, according to the trouble occasioned.

Corrections are paid for at 8d. per hour. Of course these are only "house" or "author's corrections."

Dedications, half-titles, titles, &c., are paid for as pages of the work.

Headings in smaller type than the body, but not exceeding two removes from it, if not more than three lines in depth, are paid 1s. per sheet extra; if more than three lines, or if in smaller type than two removes, are cast up according to the relative values of the two bodies; the greatest number of appearing lines being considered

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the depth. The following is considered a definition of the word "heading":—

Parish.	Name of Voter.	Residence.
Chelsea . .	John Smith . .	Belgrave-place.

Or thus, when set in small type, and forming three or more lines:—

Name of Voter.	Trade or Profession.	Place of Residence.
John Smith.....	Wheelwright.....	Chelsea.

Imprints are considered as two lines in the square of the page.

Index Matter, though but one measure, is paid 2s. per sheet extra.

Interlinear Matter is cast up as one and a-half the price of common matter; the actual number of lines of small type only being reckoned.

Law Work generally.—Work for any of the Courts of Law is charged according to the scale agreed upon for Parliamentary work.

Music is paid for by agreement between the employer and the journeyman.

Marginal Figures are charged according to the trouble occasioned.

Parallel Matter, dialogues, vocabularies, comparative statements, and matter of a similar description, although arranged in columns depending on each other, to be charged as column matter.

Parliamentary Work.—All work for either House of Parliament, such as Reports, Minutes of Evidence, &c., as well as Reports of Royal Commissions of Inquiry, whether manuscript or reprint, leaded or solid, is charged 7d. per 1000, including english and brevier; and is always cast up

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according to the type in which it is composed. Tables are charged 1s. 2d. per 1000.

Work not intended for either House of Parliament, but executed for the public departments, is paid according to the scale for book work, with all the extras.

Private Parliamentary bills are charged 7½d. per 1000, and table matter in them 1s. 3d. per 1000. There are, however, certain bills which are to be of a regular size, and for which a stated price is paid. These are as follows:—

English, 26 ems wide by 47 ems long.

	s.	d.
Without side notes, per sheet	6	0
With broad quotation side notes, ditto.....	9	0
With double narrow side notes, ditto	10	0

Pica, 29 ems wide by 53 ems long.

	s.	d.
Without side notes, per sheet	7	0
With broad quotation side notes, ditto	10	0
With double narrow side notes, ditto	11	0

Pages consisting of two or three columns with one or more headings, or three or four columns without headings, are charged as tabular, or one and a-half common matter. Pages consisting of four or more columns with one or more headings, or five or more columns without headings, are charged as table, or double the price of common matter.

Short pages in a series of tables are charged as full pages; but where a table or piece of table occurs in a Report, &c., it is charged only the depth of the table, measuring from the head to the conclusion of the table. The same rule applies to tabular matter.

Headings to table or tabular matter, when in smaller type than in the body of the table, are charged extra.

Pages consisting of four or five blank columns are charged tabular; but when the columns are six or more, they are cast up to the size of the type used in the Reports or Bills in which they occur.

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Plain matter divided into two columns is charged not less than 1s. per sheet extra. In "read-over" pages (as in Dr. and Cr. accounts of two pages, where one page is tabular, or table) the same charge is made for both pages, and in no case are read-over pages charged less than tabular.

Side notes of broad quotations, and not exceeding five lines per page, in quartos and folios, are charged 1s. 6d. per sheet; in double narrows not exceeding five lines per page, 2s. per sheet, throughout such Report, Appendix, &c., excepting when pages comprising the whole width of the page (including the whole space for side notes) occur; all above that proportion to be paid *ad valorem*. When double side notes occur in a page, they are charged double the above sum.

It is to be observed, in reference to this, that Reports, Minutes of Evidence, and Appendices are all cast up separately, and take only the extras which strictly belong to them. Thus, if a Report, &c., have side notes, and the Appendix is without side notes, no charge is made on the Appendix for side notes.

When two bottom notes, or one note of twenty lines, occurs in a Report, Appendix, &c., a charge of 1s. per sheet is made throughout such Report, Bill, Appendix, &c.; all above to be charged according to their value.

Pedigrees are paid double the price of common matter, and the heads and notes upon the same principle as the heads and notes of tables.

Slip Matter (that is, matter of which a proof is pulled and sent out when on the galley, and not made up into perfect pages) is made up at the expense of the employer.

Stereotype Matter by the plaster process, with high spaces, carries ¼d. per 1,000 additional; if with low spaces, ½d. per 1,000 additional. There is no extra charge for stereotype matter by the paper process.

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Syriac, *Arabic*, and *Hebrew* are paid double. Hebrew with points is cast up as half body and half points, doubled.

Table, and Tabular Work—that is, matter set up in three or more columns depending upon each other and reading across the page—is paid as follows:—

3 columns without headings, one-fourth extra.

3	,,	with	,,	or 4 columns without, one-half extra.
4	,,	with	,,	and 5 or more with or without, double the price of common matter.

Wrappers.—The companionship on a magazine or review is entitled to the first or title-page of the wrapper, but not to the remaining pages, nor to the advertising sheets which may accompany the magazine or review.

Provincial Rates of Wages.—Piece work is seldom done outside the London radius, except for newspapers. In the table annexed the price per thousand for three different bodies—brevier, minion, and nonpareil—is given, as paid respectively on daily and weekly papers.

The table gives particulars, also, of the different kinds of time work, both for jobbing and for newspapers; the wages, the number of hours worked, and the price of overtime, in the principal towns throughout the kingdom. It was drawn up very carefully in the early part of 1883 by Mr. H. Slatter, the secretary of the Typographical Association. The rate of overtime is difficult to give in a tabulated form, as several societies obtain increased rates after certain hours in the evening. The same remark applies to piece prices on daily papers, which are in some offices increased by a fixed sum per hour for nightwork. The minimum recognised rate is in all cases made the standard of wages, and in many instances the average is higher than the sum stated.

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PROVINCIAL RATES OF WAGES, &c.

TOWNS.	WAGES.			NEWS PIECE PRICES.						NUMBER OF HOURS PER WEEK.			OVERTIME PER HOUR.		
				WEEKLY.			DAILY.								
	Jobbing.	Weekly News.	Daily News.	Brevier.	Minion.	Nonpareil.	Brevier.	Minion.	Nonpareil.	Jobbing.	Weekly News.	Daily News.	Jobbing.	Weekly News.	Daily News.
TYP. ASS. BRANCHES:	*s.*	*s.*	*s.*	*d.*	*d.*	*d.*	*d.*	*d.*	*d.*				*d.*	*d.*	*d.*
Ashton	30	30	...	6	6	6½	...	...	...	56	56	...	8	8	...
a Aylesbury	26	26	...	...	...	...	...	...	...	58	58	...	6	6	...
Banbury	26	...	...	6	6	8	...	...	...	54	...	...	6	...	...
Barnsley	28	28	...	...	...	...	...	...	...	56	56	...	8	8	...
a Barrow	30	30	...	6½	6½	6½	6½	6½	6½	54	54	...	9	9	...
Bath	27	27	...	7	7	7	...	...	...	54	54	...	7	7	...
Belfast	30	...	...	6	6½	7	6¼	6¾	7¼	54	...	...	8	...	...
Birmingham	30	32/6	45	7½	7½	8¾	8	8¾	9½	54	52	50	9	10	12
Blackburn	30	30	...	6½	6½	6½	...	...	...	54	54	...	8	8	...
Blackpool	28/5	28/5	...	6½	6½	6½	...	...	...	52½	52½	...	7½	7½	...
Bolton	31/6	...	...	6½	6½	7	...	...	...	55½	54	54	8	8	...
a Bradford	30	32	40	6¼	6¼	6½	6¼	6¼	6¼	55	55	55	8	8	10
Brighton	29	...	...	...	...	...	6¼	6¼	6¼	60	...	...	6	6	...
Bristol	28	30	38	...	...	...	...	...	...	54	54	54	7	8	9
Burnley	27	27	...	6	6	7	...	...	...	54	54	...	7	7	...
a Cardiff	29	29	40	6¼	6¼	6¾	6¾	6¾	7¼	54	54	54	7	7	10
Carlisle	27	27	...	5½	6	6½	...	...	...	54	...	...	8	...	...
Carlow	22	22	...	...	...	...	...	...	...	60	...	...	6	...	...
Castlebar	25	20	...	...	...	...	...	...	...	54	54	...	6	6	...
Cheltenham	26	26	...	...	...	...	..	...	...	57½	57½	55	6½	6½	...
a Chester	30	30	...	6½	7	8	...	...	...	54	54	...	7	7	...
Chesterfield	28	28	...	6	6	6	...	...	...	56	56	...	7	7	...
Clonmel	22	22	...	...	...	...	...	...	...	57	57	...	6	6	...
Cockermouth	25	...	...	5½	5½	5½	...	...	...	53½	53½	...	6	6	...
Coventry	24	24	...	5	6	7	...	...	...	56	56	...	6	6	...
a Darlington	30	30	36	6	6	6	6	6	6	53	53	53	8	8	10
a Derby	30	30	...	6¼	6½	7	7	7	7½	54	54	...	8	8	...
Doncaster	26	26	...	5½	6	6½	...	...	...	56	56	...	6	6	...
Drogheda	25	...	...	5½	...	...	...	...	...	56	56	...	6	6	...
Dudley	30	...	...	6	6½	7	...	...	...	54	...	...	9	9	...
Durham	26	26	...	5½	5½	6½	...	...	...	54	54	...	8	8	...
Galway	23	20	...	...	...	...	...	...	...	56	60	...	6	6	...
a Gloucester	26	26	...	...	...	...	...	...	...	54	56	...	...	...	...
a Guildford	30	30	...	6½	6½	8	...	...	...	54	54	...	2½	2½	...
a Halifax	30	...	...	6½	6½	7	...	...	...	54	54	...	8	8	...
Hereford	24	27	...	...	6	7	...	...	...	57	57	...	6	7	...
Hertford	28	28	...	...	...	...	...	...	...	57	57	...	6	6	...
a Huddersfield	30	30	38	...	...	...	6¼	6¼	6½	54	54	...	8	8	10
Hull	30	30	40	6	6	6½	7½	7½	7½	54	54	51	8	8	12
Hyde	30	30	...	...	6	6	...	...	...	54	54	...	8	...	...
Ipswich	25	27	32	6	6	7	6½	6½	7½	54	54	54	6	6	8
Kendal	25	25	...	5½	5¾	...	...	...	...	56	56	...	6	6	...
Kidderminster	26	26	...	5½	6	6½	...	...	...	55½	...	...	6	6	...

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PROVINCIAL RATES OF WAGES. &c.—*continued.*

TOWNS.	Wages.			News Piece Prices.						Number of Hours Per Week.			Overtime Per Hour.		
				Weekly.			Daily.								
	Jobbing.	Weekly News.	Daily News.	Brevier.	Minion.	Nonpareil.	Brevier.	Minion.	Nonpareil.	Jobbing.	Weekly News.	Daily News.	Jobbing.	Weekly News.	Daily News.
T.A. Branches—*con.*	*s.*	*s.*	*s.*	*d.*	*d.*	*d.*	*d.*	*d.*	*d.*				*d.*	*d.*	*d.*
Kilkenny	22	22	...	...	...	...	...	...	...	58	...	...	6	6	...
Lancaster	28	28	...	5½	5½	6	...	...	...	55	55	...	7	7	...
a Leicester	30	31	...	6½	6½	6½	...	...	...	56	56	...	7½	8	...
Limerick	27	25	...	...	...	...	...	...	...	60	60	...	8	...	...
Lincoln	28	28	...	5	6	7	...	...	...	54	...	...	7	8	...
Liverpool	34	34	44	8½	8½	9	9	9	9½	51	51	52	10	10	12
Macclesfield	28	28	...	6	6	6	...	...	...	55	55	...	7	7	...
Maidstone	28	28	...	5	5	5½	...	...	...	54	54	...	7	8	...
a Manchester	35	35	42	7½	8	8½	9	9	9½	55	55	51	10	10	12
Maryborough	22	22	...	...	...	...	...	...	...	60	60	...	6	6	...
Middlesbro'	30	30	...	6	6	6½	...	...	...	54	54	...	8	8	...
Newcastle	32	32	40	6½	6½	7	8	8	8½	54	54	50	9	9	12
Newry	25	25	...	5	...	...	...	...	...	59	59	...	6	7	...
Northampton	29	29	...	6½	6½	7½	...	...	...	54	54	54	7½	7½	9
Nottingham	30	32	...	...	...	...	6	6	6	54	54	54	7½	7½	9
Oldham	32	32	...	6	6	6	...	...	...	54	54	...	9	9	...
Oswestry	27	27	...	5¼	6	6	...	...	...	54	54	...	7	7	...
a Oxford	36	...	...	6	6	...	6	6	...	54½	...	...	...	...	...
Plymouth	24	24	...	...	...	...	6	6	6	54	54	...	6	6	...
Potteries	30	30	...	6	6	7	6½	6½	7	56	54	...	7	7	...
Preston	30	30	...	6½	6½	6½	...	...	...	54	54	...	8	8	...
a Rochdale	32	32	...	6½	6½	6½	...	...	...	54	54	...	8	8	...
a Rugby	27	27	...	...	...	...	6	6	6	54	54	...	7	7	...
a Scarborough	28	28	30	...	...	...	6	6½	7	54	54	54	8	8	...
a Sheffield	31	32	36	6¼	6½	7	7½	7½	7½	54	54	53	9	9	10
Shrewsbury	26	28	...	6½	6½	6½	...	...	...	54	54	...	7	7	...
Southport	34	34	...	7½	7½	8	...	...	...	51	51	...	10	10	...
Stafford	28	32	...	6	6	6½	...	...	...	56	54	...	6	8	...
Stockton	26	26	...	...	...	...	...	...	...	54	...	...	6½	6½	...
a Sunderland	30	30	32	6	6	6½	6½	6½	7	54	54	54	8	8	9
a Walsall	28	28	...	6½	7	7½	...	...	...	54	54	...	8	8	...
Warrington	30	30	...	6	6	6	...	...	...	54	54	...	7	7	...
Warwick and Leamington	25	26	...	6	6	6½	...	...	...	54	54	...	6	6	...
Whitehaven	28	...	...	6	6	6	...	...	...	54	54	...	9	9	...
Wigan	29	29	...	...	6¼	6½	...	...	...	55	55	...	8	8	...
a Wolverhampton	29	31	33	6	7	7¼	6¼	7⅓	8	54	54	...	8	10	9
a Worcester	29	29	...	...	...	...	6½	6½	6½	55	55	55	7	7	7
Wrexham	26	26	...	5½	5½	6	...	...	...	56	56	...	7	7	...
a York	28	28	...	6¼	6¼	6½	7½	7½	7¾	54	51	...	8	7	10
Recognized Societies:															
Aberdeen	27	27	37/6	5¾	5¾	6¼	7½	7½	8½	51	51	51	9	9	12
Ardrossan	25	25	...	...	...	...	...	...	...	56	56	...	8	...	...
a Dublin	33	...	...	6½	7	7¾	7	7½	8¼	57	...	...	...	...	6
Dumbarton	30	30	...	...	...	...	...	...	...	54	54	...	10	10	...
Dumfries	26	26	...	...	...	...	...	...	...	54	54	...	7½	7½	...
a Dundee	26	26	40	6	6	6½	7½	7½	8	51	51	51	3	3	3
Dunfermline	25	25	...	...	...	...	...	...	...	54	54	...	8	8	...
a Edinburgh	30	32/6	40	6	6	6½	7½	7½	8	54	54	51	3	3	3
Enniskillen	20	...	...	...	...	...	...	...	...	60	...	...	6	6	...

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PROVINCIAL RATES OF WAGES, &c.—*continued.*

TOWNS.	Wages.			News Piece Prices.						Number of Hours Per Week.			Overtime Per Hour.		
				Weekly.			Daily.								
	Jobbing.	Weekly News.	Daily News.	Brevier.	Minion.	Nonpareil.	Brevier.	Minion.	Nonpareil.	Jobbing.	Weekly News.	Daily News.	Jobbing.	Weekly News.	Daily News.
Recognized Soc.—con.	*s.*	*s.*	*s.*	*d.*	*d.*	*d.*	*d.*	*d.*	*d.*				*d.*	*d.*	*d.*
Falkirk	...	25	...	...	...	...	...	...	...	...	54	...	...	8	...
Hawick	...	25	...	...	...	...	...	...	...	...	54	...	...	...	...
*a*Glasgow	32/6	32/6	40	7	7	7½	8	8	8½	54	54	51	10½	10½	12
*a*Greenock	32/6	...	32/6	...	...	...	7¼	7¼	7¼	54	...	54	12	12	12
Inverness	26	26	...	5½	5½	6	5½	5½	6	54	54	...	8½	8½	...
Kelso	25	25	...	...	...	...	...	...	...	54	54	...	...	...	...
*a*Leeds	32	...	...	6¼	6¼	6½	6¼	6¼	6½	54	...	...	...	...	...
Lewes	...	...	...	6¼	6¼	6½	...	...	...	60	60	...	...	...	...
*a*London	36	36	...	8½	8½	9½	9	9	10	54	54	...	11	11	...
Salisbury	30	30	...	6	6	6	...	...	...	56	56	...	6	9	...
Waterford	20	20	...	...	...	...	...	...	...	57	60	60	6	6	...

(*a*) These Societies have some peculiarities in their mode of payment which cannot be tabulated. The following notes explain these special features:—

AYLESBURY.—London piece prices, one-fourth off.

BARROW.—Evening papers.

BRADFORD.—Overtime on jobbing is charged 8*d.* per hour to 10 P.M., and 9½*d.* per hour after. Daily news hands receive 2*d.* per hour extra from 7 to 12 P.M., and 3*d.* per hour after.

CARDIFF.—After 10 P.M. (Saturdays after 6 P.M.), 9*d.*

CHESTER.—Overtime after 10 P.M. is charged 9*d.* per hour.

DARLINGTON.—Daily paper hands receive 2*d.* per hour extra from 7 to 12 P.M., and 3*d.* per hour after.

DERBY.—Overtime 10*d.* per hour after 10 P.M.

GLOUCESTER.—Overtime is paid time and a quarter to 10 P.M., and time and a half after.

GUILDFORD.—The piece prices are calculated at four-fifths of those paid in London.

HALIFAX.—After 10 P.M. overtime is paid 9*d.*

HUDDERSFIELD.—After 8 P.M. daily paper hands charge the same extras as Bradford and Darlington.

LEICESTER.—After 10 P.M. overtime is charged 9*d.*

MANCHESTER.—Day hands on daily papers 53 hours per week; overtime 10*d.* to 7 P.M.; 1*s.* after.

OXFORD.—Overtime is charged at 2*d.* per hour above the ordinary rate.

ROCHDALE.—Overtime, 10*d.* after 10 P.M.

RUGBY.—Overtime 8*d.* after 10 P.M.

SCARBOROUGH.—Overtime, 10*d.* after 10 P.M.

SHEFFIELD.—Overtime after 10 P.M. 3*d.* per hour extra.

SUNDERLAND.—The daily here is an evening paper.

YORK.—The daily paper hands get 2*d* per hour extra up to 12, and 3*d.* after.

ABERDEEN.—8*d.* per hour waiting-time is paid on daily papers on the piece.

DUBLIN.—Overtime on jobbing and weekly news, 3*d.* up to 11 P.M. and 6*d.* after.

DUNDEE.—Evening paper piece prices ½*d.* more than weekly rates. Overtime 3*d.* per hour extra.

EDINBURGH.—Overtime same as Dundee. Waiting-time is paid as in Glasgow.

GLASGOW.—Brevier and minion ½*d.* less per 1,000 for reprint on weekly papers. Waiting-time, 1*s.* per hour, is paid on daily papers on piece.

GREENOCK.—Daily paper rate applies to evening papers.

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LEEDS.—Overtime 2*d.* per hour from 7 to 12; 3*d.* from 12 to 2.30; 6*d.* after, to close of work. This rate is also paid in addition to the piece prices on daily papers.

LONDON.—The above daily paper prices are for morning papers; evening paper prices are 8½*d.* and 9*d.* respectively. Overtime is paid at the rate of 3*d.* per hour extra to piece hands on book work after 54 hours, and on weekly newspapers after 60 hours, each day standing on its own merits.

WOLVERHAMPTON.—Daily paper here is an evening one.

WORCESTER.—Daily papers are evening ones.

It should be mentioned that although fifty-six hours per week is the maximum of working time on piece or 'stab, the local rules define when a day's work begins and ends (providing for the day preceding the publication of newspapers) without a proportionate advance for overtime and Sunday work. No society is eligible for admission to the Typographical Association, and no man can be recognised as a member of that body, that accepts a 'stab of less than 24s. per week, or an equivalent piece scale. In the provinces, persons engaged on 'stab wages may be required to change to piece-work prices, or *vice versa*, but at least a fortnight's notice must be given previous to such change.

CHAPTER XXXIII.

RULES AND REGULATIONS OF NEWS WORK IN LONDON—System of Payment.

IN London, News work forms almost a distinct branch of the printing business, and the regulations affecting it are so important that we devote a separate chapter to them.

Within the last few years, very considerable modifications have been made in the system of payment for compositors' work on daily newspapers. A number of old regulations have been entirely abrogated, and the plan of dividing the men into full or "'stab," and extra or "grass" hands has been discontinued. Overtime is now altogether abolished, except in regard to weekly papers.

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All newspapers, or publications partaking of the character of a newspaper, composed in London, are charged according to the following scale of prices:—

DESCRIPTION OF PAPER.	PER 1,000 EN QUADS OF OWN BODY.						
	Minion and Larger Sizes.	Minion-Nonpareil.	Emerald.	Nonpareil.	Ruby.	Pearl.	Diamond.
	d.	*d.*	*d.*	*d.*	*d.*	*d.*	*d.*
Morning	9	9½	9½	10	10½	11	13
Evening.....	8½	9	9	9½	10	10½	12½
Weekly and Wider Periods...	8½	9	9	9½	10	10½	12½

The minimum wages of establishment hands on weekly papers, and those published not oftener than three times a week, is 36s.; but a higher rate generally prevails.

The price per galley on morning papers is 3s. 10d.; on evening and weekly papers 3s. 7d.

Time work is paid for per hour on morning papers 11½d.; on evening papers 11d. or 10½d.; and on weekly papers 10d.

In order to carry out this system, a standard depth of type has been agreed upon. It differs considerably from the actual dimensions of the various types, as given at page 18 of this work; but as it is the recognised basis of calculation, we here reprint it:—

LINES TO A FOOT.

English	64	Bourgeois ...	102	Nonpareil...	143
Pica.....	71½	Brevier	110	Ruby	166
Small Pica ...	83	Minion	122	Pearl.....	180
Long Primer	90	Emerald	128	Diamond....	204

In founts below minion, when the type comes under the above standard, an advance of price is granted if it is

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equal to or exceeds half of the difference between the larger fount and the next smaller one, but under that proportion no extra charge is made. Thus, when a bastard nonpareil contains half as many more ems to the foot as the difference between nonpareil and ruby, a farthing extra is charged, but if under that proportion no charge is made. In every instance, of course, the founts are cast up to their own ems. One farthing extra is paid on all founts for every en below 12 ems of their own body in thickness.

A thick space is reckoned an en in the width.

Engagements on Daily Papers.—There are only two kinds of engagements now recognised, "regular hands," * and "assistants."

Regular Hands are secured one galley per day, and as much in addition as the requirements of the paper will admit of their obtaining.

Assistants are secured one galley on morning, and half a galley on evening papers, each time of working.

Regular hands are engaged by the fortnight, to do at least one galley per night, as above stated. The galley is reckoned as four hours' work, including corrections. These hands are expected to correct as nearly as possible the amount of their composition. Should the "printer" (that is, the overseer) be unable to furnish copy according to the preceding specification, the hands charge at the rate of one quarter per hour from the time of taking copy until the finish.

Assistants are not under any regular engagement, but are entitled to a galley, and must be furnished at the rate of a quarter per hour from the time of taking copy. Assistants employed by the property or firm at a galley per night, are, however, entitled to a fortnight's notice.

Time work is paid at not less than 11½d. per hour.

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* The employment of "full hands" formerly existed on daily papers; but the system, being found entirely unsuited to their present requirements, has gone into disuse.

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In regard to *corrections*, it is settled that all matter composed after the paper has gone to press, when making less than a galley, is corrected by the house.

Regular hands on *Evening papers* are guided by the same rules as laid down for those on the morning papers, claiming a galley or charging the same at the expiration of four hours from the time of taking copy.

Time work on evening papers is thus paid:—Every odd quarter or hour carries the charge of 11d. Thus, the first quarter or hour would be 11d., the second 10½d., the third 11d., and the fourth 10½d., making the four quarters or hours 3s. 7d.

Compositors (not forming a portion of the regular companionship) called in or ordered to attend, after copy has been taken, to assist on the first edition of an evening paper, are entitled to not less than half a galley.

The following rules are applicable to both morning and evening papers:—

Not less than one hour to be charged on time; but the fractional parts of an hour beyond that period to be charged at their value in lines.

Extra Editions are done on time or lines, at the option of the printer. If on time, only the rate of a quarter per hour is produced; if on lines, and there be not a sufficient supply of copy, the rate of a quarter per hour is charged. No charge must be less than a quarter. Each edition is a separate charge, unless several editions are going on continuously, in which case time or lines is to be charged from the commencement till the finish of these editions. On morning papers an extra quarter is allowed to persons called in to assist, if the quantity composed be less than a galley.

On extra editions, when the compositor is required to "pull out," that is, to compose more than a quarter per hour, the general practice is to charge the lines so composed. Thus, compositors detained for three hours for an extra edition, and then ordered to "pull out" for another hour, during which time they might compose half a galley, would charge a galley and a quarter, instead of only the four hours they were engaged.

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All composition or corrections in hand when the paper goes to press must either be suspended or charged as a second edition—that is, charging not less than a quarter of a galley.

On daily papers, matter composed before the usual time of commencing work, such as leading articles for editors, advertisements as copy for other papers, &c., to be charged distinct from the day's work. If less than a quarter, a quarter to be charged; if more, the number of lines.

Assistants, if ordered to attend at the ordinary time of taking copy, are entitled to the charge of a galley; but if holding a *bonâ fide* employment by the house, and taken from other work when their services are required, are entitled to not less than a quarter for each time of being called on.

No *apprentices* must be employed on daily papers, morning or evening.

Tri-weekly and bi-weekly papers are regarded as if they were weekly; but in all cases of newspapers published oftener than three times a week, the mode of producing which is similar to that of a daily paper, the same must be paid for in accordance with the daily paper scale.

We now come to *Weekly papers*. The engagement for the establishment hands on weekly papers is nine hours' work per day. The time of commencing is the same for each day, being fixed at the option of the employer; and all work prior to or after the specified time is paid for at 11d. per hour. Extra editions are done on time or lines at the option of the printer. If on time, only the rate of a quarter per hour is produced; if on lines, and there be not a sufficient supply of copy, the rate of a quarter per hour is charged. No charge less than a quarter. Each edition is a separate charge.

Time work is paid at the rate of 10d. per hour, subject to extra for overtime when sixty hours have been worked.

No compositor on the piece is called upon to work more than six hours of overtime during the week, without charging 3d. per hour extra. The week consists of fifty-four hours, and the overtime commences when the sixty

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hours are completed, such hours being governed by the ordinary working hours of the house, and are all worked in one night or divided, as may suit the convenience of the employer; provided that in no case can a piece compositor be called upon to work after 12 p.m. without receiving the extra overtime.

Assistants employed in the house cannot be called on to correct their matter unless they compose a galley.

No deduction is made for letter when the composition is under a galley. When the composition exceeds a galley, the letter is either deducted for or returned, at the option of the compositor.

Compositors cannot be called off piece work to compose on time.

Periodicals partaking of the nature of newspapers, although published regularly at periods exceeding a week, are considered newspapers, and paid agreeably to the scale for weekly papers.

The definition of *newspapers*, for these purposes, is: "Publications which appear weekly, or at wider periods, containing general news, either parliamentary reports, reports of police or law courts, foreign or provincial intelligence, reports of daily occurrences, or notices of bankrupts or insolvents, to be paid according to the scale for newspapers."

Publications containing only reviews of books, notices of dramatic or musical performances, articles on the fine arts, accounts of the meetings and proceedings of religious, literary, or scientific societies, and advertisements, are paid the same as monthly or quarterly publications. Should the mode, however, of getting up these publications materially differ from the common mode of doing book work, and the compositors have frequently to "make even lines" with "takings" of a few lines each, and other disadvantages connected with a newspaper, then they take the newspaper charge.

Unless mutual agreements exist to the contrary, no compositor can be called upon to pull a galley containing less than a quarter of a galley of fresh matter. Nor can a

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compositor be expected to seek for a galley wherein to insert less than one eighth of a galley of fresh matter, without being entitled to charge 1d. for the trouble occasioned thereby.

'Stab hands, when engaged on the line, lift copy fairly and in regular numbers with the piece hands. Apprentices who have served four years of their time lift copy with the men. The foregoing does not apply either to advertisements or articles given out in their entirety to 'stab hands or apprentices. The minimum 'stab wages are 36s. per week of fifty-four hours, overtime being paid at not less than 11d. per hour.

A compositor called in to assist—that is, one who is not already employed in the house—is entitled to charge not less than four hours, if employed on time, or less than a galley if paid by lines. A compositor engaged on extra editions, when required to "pull out," that is to compose more than a quarter per hour, is entitled to charge the lines so composed, that is, if he is detained three hours for an extra edition and then ordered to pull out for another hour, during which time he may compose half a galley, he is entitled to charge a galley and a quarter, instead of only the four hours actually charged.

"Special Sunday work," is work performed after the ordinary and regular editions of any weekly paper have been sent to press and worked off, and is paid for at the rate of 6d. per hour extra from 12 o'clock on Saturday night to 12 o'clock on Sunday night, but in no case can a compositor receive less than 2s. 6d. extra. This does not, however, apply to those journals the getting out of which regularly enters into Sunday morning.

The following are some general regulations for daily and weekly papers:—

Not more than three slips are pulled of each galley, including the revise; if more than three are required, lines are charged equivalent to the trouble, but not less than three lines are charged.

All leads other than those used in making up are charged by the compositor.

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Bastard founts of one remove are cast up to the depth and width of the two founts to which they belong; of two removes are cast up to the smaller body, both in depth and width.

Matter having once been used, becomes the property of the employer.

General heads of articles and the rules after, whether standing or not, rules in the middle of articles (unless placed by the printer for the convenience of making up), half-doubles, or other rules at the end of articles, let-in blocks, and wood cuts inserted by the compositor, are charged by the compositor.

Standing advertisements, brass or other clump heads, and the date line attached thereto, wood cuts, leads, and rules in the middle of articles inserted for convenience of making up, being placed on the galley or in the forme by the pointer or his time hands, are the property of the employer.

Supplements to newspapers are charged according to the scale of the paper to which they are attached.

Matter composed in London for a paper printed in the country, is paid according to London scale, whether daily or weekly.

Newspapers stereotyped with plaster of paris, or any other matter giving additional trouble, take an advance of one halfpenny per thousand.

Alterations from copy in first proofs, if done by the compositor correcting such proof, are charged according to the time occupied in making such alterations, not less than three lines being charged. This applies solely to alterations made by the reader, and not to author's corrections.

Copy making less than three lines is not considered a take; if less, three lines are charged.

No compositor can be called upon to "clear away" newspaper work.

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In regard to table, tabular, and column matter, the following are the regulations:—

Two justifications or arrangements constitute half-measure, and take one-third extra; three justifications take one-half extra, four or more are charged double.

Title-headings to table or tabular matter, not exceeding five lines, take the charge of the matter to which they are attached; above five lines, no extra is charged.*

The following pamphlets, issued officially by the London Society of Compositors, are very useful to men working in the metropolis: 1. "The London Scale of Prices for Compositors' Work," price 6d.; 2. "The Report of the Journeymen Members of the Conference of Master Printers and Compositors, held in 1847," price 3d.; 3. "The Typographical Ready Reckoner and Memorandum Book," price 3d.; and "The Compositors' Guide to the London Printing Offices, price 2d." The offices of the society are at 3, Raquet-court, Fleet-street.

CHAPTER XXXIV.

MUSIC PRINTING—Different methods: Pewter-plate, Lithographic, Typographic—Advantages and Disadvantages of each—The Musical Symbols and their Meanings—A Fount of Music Types—Uses of the several Characters.

WITHIN the last few years a great demand has sprung up for type-printed music. This is owing to the fact that whereas formerly a knowledge of music was confined to a few, at the present time even children in primary schools are taught the rudiments of the science. When no other process for printing music was practised than that of engraving it on copper and pewter plates and printing from them at the copper-plate press, or of drawing it on stone and printing at the lithographic press, copies of musical

* The portions of this work referring to the scale of prices for compositors' work, and the regulations of the London Society of Compositors, have been kindly revised by the Secretary, Mr. C. J. Drummond.

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pieces were necessarily dear, and produced in comparatively small numbers. By means of moveable types and the letter-press machine, however, music is now published almost at as low a price as an equal amount of ordinary text composition. Not a few of the popular magazines, too, contain music which is worked in the sheet with the ordinary reading matter.

There are three principal methods adopted at the present time for reproducing musical compositions. The first is to draw them on prepared paper and transfer them to the lithographic stone. The second is to engrave them on pewter plates—which are used on account of their greater softness and facility for working, as compared with other metals—and then to take a lithographic transfer, which is laid down on the stone. For the first method a pen and a ruler are all the appliances necessary: for the second a number of tools are required, consisting of straight-edges, to rule the lines perfectly parallel, and gravers to incise them. The several notes are not cut, but *punched* into the plate by steel tools of the appropriate shape, and mallets of various sizes. The latter method is carried on in London by a class of artisans who make a distinct trade of it; they do not undertake any other kind of engraving. The third method is the typographic one, which we are about to describe.

In regard to the comparative advantages of the three methods, it may be remembered that professional musicians prefer the pewter-plate prints, as they are more easily read than any others. They do not present that crowded appearance which is the usual characteristic of type-music. This latter objection, however, can be easily obviated, and this kind of print made as plain, open, and legible as the other. The confusion arises from the mistaken policy on the part of the publishers, who crowd as much as possible into a given space, regardless of appearance and ease in deciphering. This system undoubtedly brings type-music into disrepute, and it is probably quite unnecessary, as there is reason to believe that purchasers would prefer, for a given sum, a smaller quantity of music

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plainly and explicitly set out, than a larger quantity crowded together and extremely unpleasant to read.

There is, also, about pewter-plate printed music a freedom that cannot be imitated with moveable types. A page may be made "like a picture," as it is said; the slurs, the grouping of the notes, rests, &c., can all have an artistic effect given to them, which the worker in rectangular types cannot hope to accomplish. On the other hand, whenever text has to be introduced—the words of a ballad or an opera, for instance—the letter-press printer has the advantage.

In many of the large offices in London and the country, music composition is regularly done, but in the metropolis it has been made into an independent department of the printing business. There are offices which undertake hardly any other kind of work. If the manager of a periodical desires to give a page of music, he sends the copy to one of the music-printing establishments, and in due time receives back a stereo or electro plate, which he can work with the rest of his pages, just as he would a cast or an engraving. The fact of the demand for music work being altogether beyond the means of supply, originally called this trade into existence. No ordinary compositor can set up music without some previous training and considerable instruction, and the advantage of these separate offices is that they have always at command a body of experienced and proficient hands—men, indeed, who do little else. We are indebted to Mr. George Wilson, of Turnmill-street, one of the best and most extensive music printers in London, for most of the particulars which follow. No English technical hand-book has dealt with this subject in a way at all adequate to its growing importance; indeed the ordinary references to the art of music-setting are altogether useless. It will, of course, be understood that in this branch of skill, as in all others, proficiency is only arrived at by practice; and the most careful perusal of this chapter will never make a music compositor. By perseverance, however, any ordinary compositor may, if he follows out the following directions, undertake music composition in a comparatively short time.

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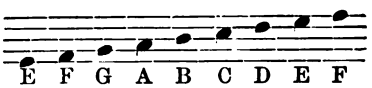
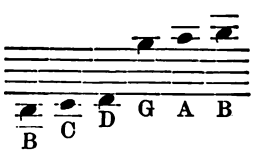
Some knowledge of music is essential to the proper execution of this kind of composition. It is impossible to set up any piece from manuscript unless the meaning of the musical phrases and the time value of the notes and rests be understood. We propose to begin with this elementary kind of instruction; omitting everything that, however important to the musician, is unnecessary to the compositor

The first thing to be learned is the alphabetical *names of the notes.* They are as follows:—

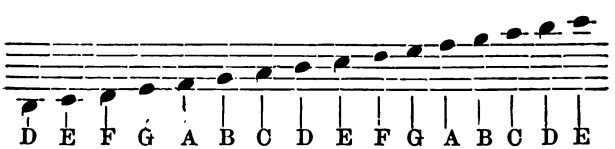
Treble Notes.



These five parallel lines form the "stave." When there are higher or lower notes in the composition than can be represented on the stave, additional and supplementary lines are added, called "ledger" lines; thus:—



The *Bass* notes are thus named:—



It will be observed that all the notes are either intersected by one of the *lines* of the stave or occupy the *space* between two lines. They are distinguished accordingly as "line notes" and "space notes."

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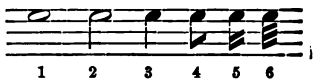
The next thing to be learned is the *value* of the notes. There are seven kinds of notes used, viz. :—



1. The *Semibreve*, a white note.

2. The *Minim*, a white note with a stem.

3. The *Crotchet*, a black note with a stem.

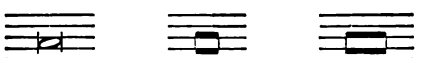
4. The *Quaver*, with a transverse line to the stem.

5. The *Semiquaver*, with two lines to the stem.

6. The *Demisemiquaver* with three lines to the stem.

7. *Semi-demisemiquaver*, with four lines to the stem (seldom used).

Besides these there are



These types were almost discarded until the revival of Gregorian music in the Anglican Church caused their renewed use.

The value of the notes is the duration of time over which they extend; that is, the length of the musical sound that they indicate.

The following is the musical "time table" :—

One semibreve equals two minims; one minim equals two crotchets; one crotchet equals two quavers; one quaver equals two semiquavers; one semiquaver equals two demisemiquavers.

The following diagram will show this perhaps more plainly. It gives the equivalents of each of the notes; so that whenever one occurs in one stave the corresponding

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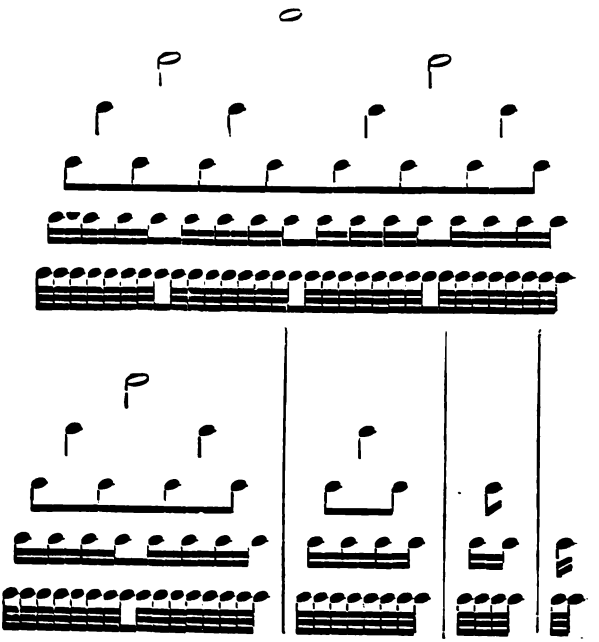
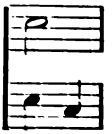
stave must be filled up by notes of the value represented between the perpendicular lines:—



In setting up music, then, in which there is more than one stave, the notes must range over each other, perpendicularly down the score. Thus, if there be a minim in the top stave, space must be left after it equal to what will accommodate its equivalent in the other staves. Thus:—



Here the lower stave contains two notes, while the upper contains but one; yet the length of the two staves must

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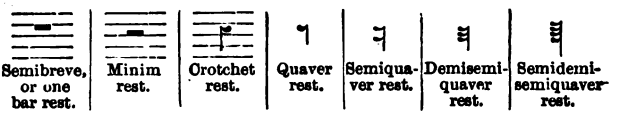
be exactly equal. This is the reason why the compositor must understand the value of the several notes.

Besides the notes there are *rests*, indicating pauses, which must range in like manner. They are thus named :—

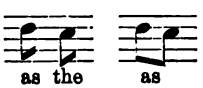


The notes, with the exception of two, consist of two parts, the head and the stem

The stems of the notes may be turned either upwards or downwards, as may be most convenient in placing them on the stave.

In instrumental music, tailed notes should be connected together in groups of two, four, or eight, so as to be more easily read, as shown in the annexed example :

but in vocal music the tailed notes are separate or joined together, according as to whether one or two notes are required to be sung as one or two syllables, as—



The strokes &c., placed over a note or printed across the stem of it show accordingly that it is to be divided into quavers, semiquavers, demisemiquavers repeatedly.

The following are the significations of the miscellaneous symbols indicated. A treatise of some considerable length might be devoted to this subject, but we must confine ourselves to the signs that it is necessary the compositor should understand :—

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3 5 &c., marks placed over groups of three or five notes indicating that five notes must be played in the time of two; five notes in the time of four, &c.

G clef

F clef

Clefs.—These signs are always made in one piece.

C clef

also called the tenor clef.

flat.

double flat.

single flat.

sharp.

double sharp.

single sharp.

natural.

or

repeat-dots, used when a strain is to be repeated.

common time.

𝄋 sign.

♩ or ♩ appoggiaturas.

~ turn. ≀ inverted turn. *tr* thrill or shake.

< < < or ~~~ vibration. } arpeggio.

𝄐 pause. = organ tone.

<< crescendo. >> decrescendo.

<> || swell. >< decrease and increase.

> sforzando; written also ∧ or ∨

ˈ staccato. ⌒ slur or bind. { brace. *w* direct

✳ ⊕ or ⌃+ (in pianoforte music) use the pedals.

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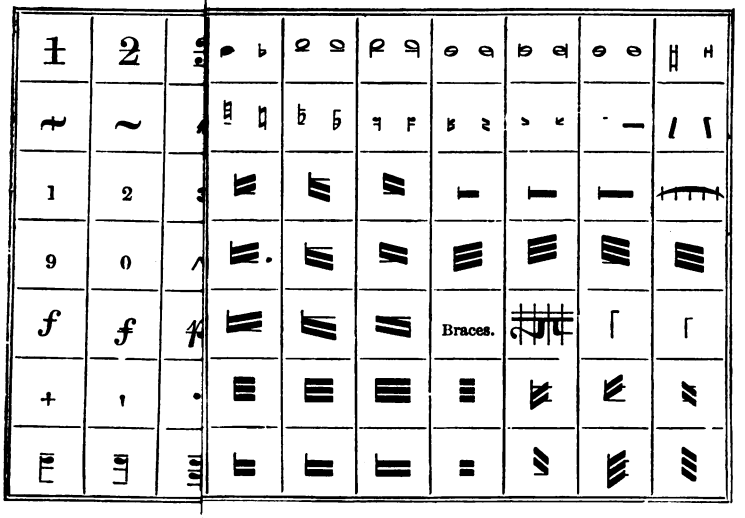

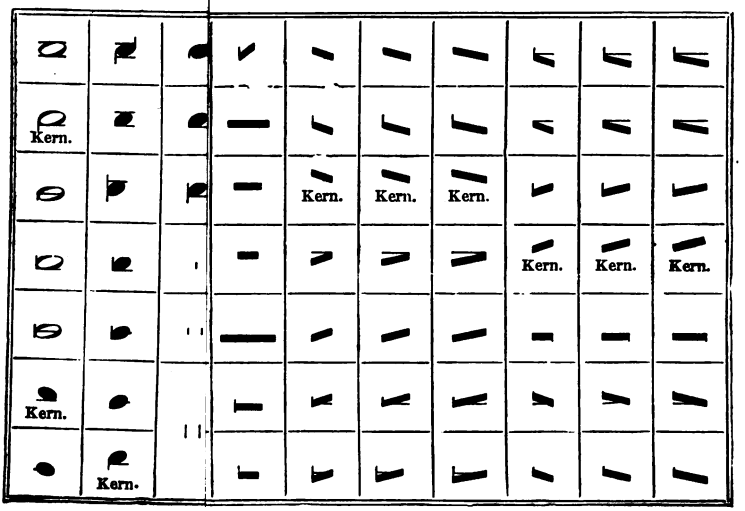

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the staff. the bar. double bars.

close; sometimes printed thus:

✱ Used after the preceding to denote a discontinuance of the pedals.

▭ or ∧ (in violin music) a downbow or an upbow.

∆ a phrase. ⊐ a section. ○ a period.

(Some compositors use the ordinary marks of punctuation instead of these three last signs.)

f forte. *ff* fortissimo. *fz* sporzando. *m* mezzo. *mf* mezzo forte. *p* piano. *pp* pianissimo. *ppp* very pianissimo. *rf* rinforzando, the same as > *sf* sforzando.

Most of the letter founders supply music types, and their systems, unfortunately, differ somewhat. The most complete is that of the Patent Type Founding Company (Mr. Shanks), which we will adopt for the purpose of explaining the method of music composition. Any one conversant with it will experience no difficulty in working with other founts.

The accompanying illustration shows the "lay of the case" for music.

On account of the immense expense of cutting punches for a fount of music, there are not many sizes cast—the most usual ones now made being *semi-nonpareil*, *gem*, *diamond*, and *ruby*. The number of sorts to each fount varies considerably, some founts having between 300 and 400 different stamps, others not nearly so many. In some founts a note may be in one type, in others several types may have to be lifted to make the same note. This will be exemplified when we explain the number and use of the various pieces. We will select, as being the most

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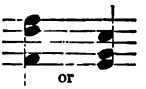
in use, what is known as the diamond 1½-em fount of the foundry named.

All the pieces of a fount of music are cast to the en, em, 1½-em, &c., of its own body. This is necessary to secure exact justification.

We will now go through the different characters *seriatim*, stating their respective names and uses.

"Single-line note head."

Used as the top line note of a chord, or the one furthest from the stem, as



"Single line 2-em note head."

The difference between the two is that the last has an en rule attached to it.

"Single line 2½-em note head."

This has an em rule attached to it. The last two named are rarely used, as they are almost impracticable, and serve chiefly to increase the number of sorts, which are already numerous enough. It is found, also, that the en and em rule attached are especially liable to damage before the rest of the stamp is injured, and thus the whole is rendered useless.

These stamps may be single or double body; that is, one or two-line characters.

"Single body line continuation note head."

This is 1½-em in dimensions; it is used for any of the inner line notes in a chord, nearest to the stem, as

The stem is formed by using a character thus |, consisting of a single line. It is two bodies, or two-line in

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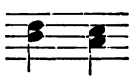
depth. If used in the stave, it has the stave lines attached to it, as ⊏, and is of various widths, 1-em, 2-em, 2½-em, and 3-em.

The spaces between the notes are rules of single and double body, and of various widths, from one en to four or five ems, such as

— and ═

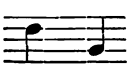
It follows from the preceding, that in determining what space there should be between one note and another, it must be always borne in mind that *the longer the stem used the shorter the rules must be.* For instance, if notes in a line stand four ems apart, as



a "double body 4-em rule" ═ is placed between the note heads, and between the stems a "double body 3-em rule" ═. But, on the same principle, a "2½ stem" ⊨ must be used to make up the deficiency, that is 1½ to cover the note head, and the remainder to add to the 3-em rules.

"Double body line note head."

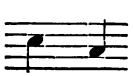
It is used with stem as



and is 1½-em in dimensions. Care must be taken that the longer the stem that is used, the wider the rule must be, in proportion to the space between the notes.

"Double body space note."

Also 1½-em in dimensions. It is used thus:



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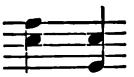
"Continuation space, 1½ em," used as



In this instance it is nearest to the stem.

"Double space continuation,"

3 bodies in depth and 1½ bodies in width. It is used as in this case:

Two "line" and two "space" note heads are cast in one piece, as or or

Line-note and stem (double body) in stave, as

Line-note (single body) and stem | (double body) out of stave, as

Space-note and stem (double body), as

or, out of stave and the piece | forming

A "line stem;" a "space stem." It will be noticed that the line stem does not extend below the bottom line, while the space stem has as much below the bottom line as above the top line. This is necessary in order that the length of a space-note stem should be the same as a line-note; for if we examine a double body line-note it will be seen that there is a greater length of stem attached to it than there is to the space note, so that the space-stem requires to be longer, to make up for the deficiency.

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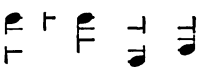
"unison space-note," used with stem up and down, as

It is equal to two bodies.

"Unison line-note," used with stem up and down, as

It is equal to one body.

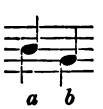
When a note falls on the centre line, a stem is used with only one stave line. It is called a "B stem," or "cut stem":—



With a space-note following in the second space, having its stem down, or on the third, with space stem up, as

the "C stem" is used.

The unison line-note is made with (one body note-head) (T pieces) acccording to the width required, and (B stem), or (stave stem). The following examples will show the use of these pieces:—



a *b*

At *a* the pieces used are (B stem), both the up and down stem being made with exactly the same pieces;

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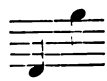
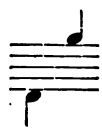
at *b* the pieces are ⊢ ⊏ for the up stem, and ⊢ (C stem) for the down one.

Notes out of the Stave.—Such notes as are called "D notes;" they have the usual space stem, as

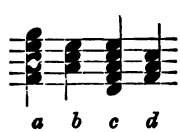


Notes of this shape are called "B notes," and have "white stems," or stems without stave line, attached to them | . They are used as in this instance:—



As the notes stand in the same position as those called D notes, it may be asked, why call one D and the other B? The answer is, that this is done simply to distinguish them, and not because the position they occupy would denote them as being D or B in the treble clef.

There are distinct characters used for making space chords in combination to any extent. In the annexed example



the necessity for such notes will be seen. The following are the characters used:—

No. 1 is the top note of the chord if out of the stave; No. 2 is the top note if within the stave; No. 3 is an

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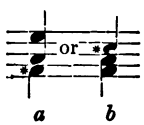
intermediate space continuation chord (as many of these may be used as is needed to complete the chord); No. 4 is used next to the stem and joins it.

The examples *c* and *d* are similarly constructed to *a* and *b*, but inverted, to show the use both ways.

This is a combination of and , and forms the two top notes of a line chord.

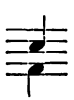
This is a combination of and , and forms the two top notes of a space chord.

This note must not be mistaken for the D note; it has a different use assigned to it. If the character is examined, it will be seen that it is kerned, or cut away, underneath the black part of the note, so that when placed as in the following chords it overhangs the note next to it.



The notes marked * are the kerned notes.

When two ordinary space-notes are placed head to head, as



it will be seen that there is still a full space between them, but if a kerned note is used, the notes appear in the next spaces to each other, as . This is a combination which has lately been cast in one piece—occupying three bodies in depth, and is very useful in short score, as it obviates the use of the kerned notes, which are liable to get broken.

Short Score is where the four voice parts are compressed into two staves—treble and bass. It is much used in

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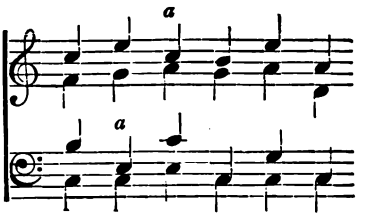
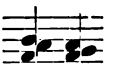
hymn books and similar publications in which economy of space is important.



The compositor should notice at the points marked *a* the use of the 3-body double space-note stems up and down.

 These are used for backing notes, as

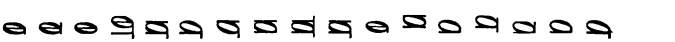


The first one forms the note A in the first chord; the second is for G in the second chord.

The black notes are $1\frac{1}{2}$ ems in width, the white notes 2 ems in width. The white notes are worked in precisely the same way as the black notes.

White notes generally used.

White notes with reversed stems.



These types are used where stems are required for the opposite side. The notes, however, are so seldom used that the type founders do not supply the characters unless specially ordered to do so.

We will now proceed to explain the use of the quaver, semiquaver, and demi-semiquaver tails and binds.

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When the stems of quavers, semiquavers, and demi-semiquavers are turned upwards, they are first made exactly like crotchets—

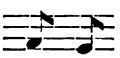
and then the tail is added at the back of the stem to denote its value, thus:

quaver semiquaver demi-semiquaver

but when the stems are turned downward, the tails join the noteheads at once, without first being formed like crotchets.

The following pieces are used to make these notes:—

For a line or space quaver with a stem up, this piece is used to "back" the stem—turned one way it joins a space stem, inverted it joins a line one, thus:



For a line quaver with a stem down, this character is used to join the notehead, thus:

For a space-note with a down stem, this piece is used, thus:

For a line semiquaver with an up stem, this piece is used, thus:

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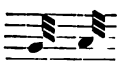
and for space-note, this character thus:

For the down stems, a line semiquaver is made with this piece thus:

and a space one with this, thus:

The demi-semiquaver line and space tails are made with the same piece, namely, thus:



Both the down stems of line and space demi-semiquavers are also formed with one character, and are made thus:

When the stem appears out of the stave, tails must be used which have no stave lines attached to them,

This piece is used for a space quaver with a stem down, thus:

and this one for a line note

In this instance a single-body line note must be used, and a "white single-body stem," so as to make the stem the required length.

The quaver tail for an up stem is also cast without a line, to work out of the stave.

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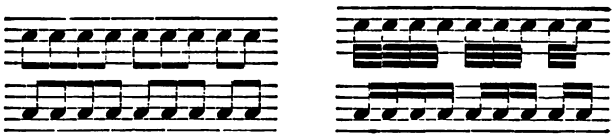
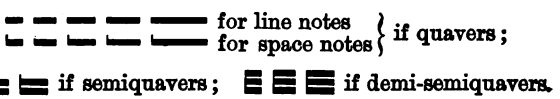
In instrumental music, two, three, four, or more notes are often grouped together, according to the time in which the music is written, as



In such cases the following pieces are used:

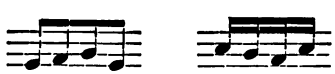


Of these pieces the quavers occupy one body only, and the semiquavers and demi-semiquavers two bodies; therefore, as each note and its stem should take up four bodies, the quaver requires a "T piece" placed in between the note and quaver bind to make it the requisite length; this is when all the notes of the group are alike, as at *a*. When, however, the notes are different, as at *b* and *c*, the note nearest the stem, that is, the highest note when the stems are up, and the lowest note when the stems are down, takes its proper length of stem, and all the other stems are lengthened by T pieces to join the bind.

The above binds are used only when the groups are all in one position, thus:

a

or when the notes run up or down and return to the starting note, thus:



b *c*

We think the explanations given will enable the compositor to form groups or notes which require *straight*

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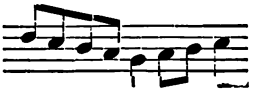
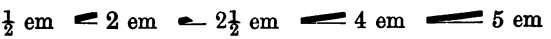
binds; but when the notes run up and down, each note being one degree above or below the preceding one, as in the following example, different characters are required:—



We will now proceed to explain the use of the *up* and *down* binds. The sorts necessary are

These pieces are cast in various sizes, ranging from $1\frac{1}{2}$ ems, the width of the noteheads (which necessitates the notes for which this piece is used being close together), to 5 ems, which size admits of $3\frac{1}{2}$ ems of blank rule or space being placed between the notes; when more space is required between the notes, two or more pieces must be placed end to end; thus, for instance, supposing we have $6\frac{1}{2}$ ems between two quavers, we must use two 4-em pieces together to make the 8-ems—$1\frac{1}{2}$ ems notehead and $6\frac{1}{2}$ ems between, and so on.

We must now explain the separate uses of each of these pieces. There are five sizes of the first of these characters, which always *cover line* notes.



They are used where two or more notes are placed as in the following example:—

In this case a space-note commences a group. The bind covers a line note. So that when a group of notes commences with a space note and proceeds regularly up the scale, any one of the above characters, according to whether the music is set close or open, should be used as the *first* bind.

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We now come to the up quaver binds to *cover space* notes. They are as follows:—

1½ em 2 em 2½ em 4 em 5 em

These are intended to commence a line note and cover a space note, as

There are also down quaver binds to cover space notes, as

1½ em 2 em 2½ em 4 em 5 em

The down quaver binds to cover line notes, as

are the following:—

1½ em 2 em 2½ em 4 em 5 em

The semiquaver and demi-semiquaver characters are used in a similar manner to the quaver. There are not so many sizes of these pieces as there are of the quaver binds—of the semiquaver three sizes are cast, viz., 1½ em, 2 em, 2½ em; if any others are required they must be made by joining two or more together; and of the demi-semiquaver there is but the one size cast, which is shown —two ems in width.

Grace notes are generally made a line shorter than others in the stems.

The other characters sent in a fount, such as rests, dots, slurs, marks of expression, &c., are placed as required. They do not need any explanation.

Subject to these peculiarities, music composition is a kind of mosaic work, which will tax the ingenuity and

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patience of the workman, but which requires no further elucidation.

Along with the manuscript, the compositor should be supplied with instructions as to the dimensions of the page required, and the size of the type to be employed.

Begin by counting the number of measures in the piece, and apportion to each measure the amount of ems in length of which the page will allow, so that there shall be a general equality of space throughout the piece.

In instrumental music, and in pieces which are not interlined with poetry, the compositor should set two or more staves simultaneously, ranging the leading notes in the under staves precisely under the corresponding ones in the upper staff; that is, a certain amount of space in each staff, in a brace, must contain the same quantity of time value.

Where lines of poetry are interspersed, as in church music and ballads, the staves are necessarily set singly, and in composing the second staff the workman must therefore constantly refer to the first, in order to make the staves correspond, proceeding in like manner with the third and fourth.

A good compositor will be careful, whenever practicable, to make the lines overlap each other, brickwise, and not allow one joint to fall directly under another.

In some music founts the lines are cast double, to expedite composition. This really results in inferior work, although it is done more rapidly. The joint of the lines, coming under one another, are apparent in the entire depth of the staff. After a fount has been in use some time these joints (or rather openings between each) will become very visible—and unsightly. To remedy this, the stereotyper runs a brass rule along each stave line in the mould before it is thoroughly dry, thus closing up all the unsightly gaps between each rule, which are observable in a proof pulled from type that has been in wear a time.

The compositor should be careful to make the stems of all the notes in a page of the same length, except those of grace notes, which, as already stated, should be shorter than the stems of the other notes.

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PART SECOND.—PRESSWORK.

CHAPTER I.

THE PRINTING PRESS—Its Principle—The Bed—The Carriage and Rails—The Tympan—The Frisket—Characteristics of the Albion and Columbian Presses Respectively—Description of their Mechanism—How they are Set Up, Kept in Order, and the Impression Regulated.

WE now enter upon the second branch of our subject—practical Presswork. We shall have to deal with a department of the printing office altogether distinct from the composing room; with an entirely different kind of appliances and processes, and to a certain extent with an altogether different class of operatives, whose manners and customs are peculiarly their own.

The object that first strikes a visitor to the press-room is, of course, *the press*, and we may well begin by describing that important piece of machinery.

There are several varieties of presses in use at the present day. There is the old wooden press, still to be found in some small offices in London and in the country. There are also the iron Stanhope press, the Britannia, the Imperial, and one or two others; but in the best offices these are chiefly used now for pulling proofs upon. Practically there are only two presses in actual use, the Columbian and the Albion; and to these we will confine our attention.

The principle of the press is, briefly, this:—The forme of type is placed on a flat plane of hard material. Over this is another flat plane of iron or other metal, and the latter moves vertically, being always kept parallel to the other. The sheet to be printed, being upon the type, the moving plane approaches and finally comes in contact with it, and the force with which the two come together causes the impression on the paper.

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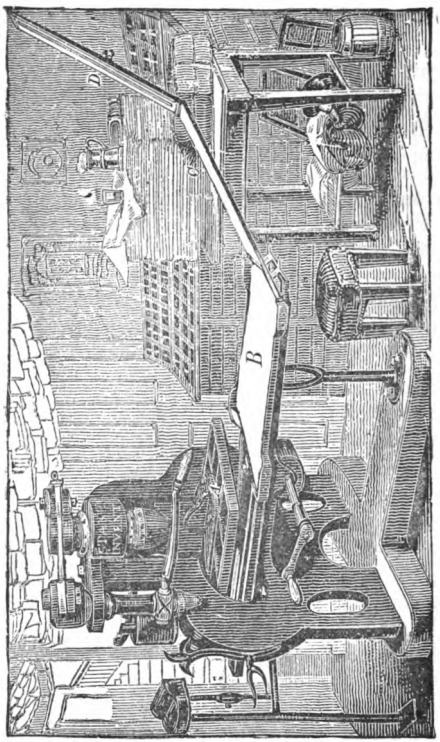
Although this operation seems to be a very simple one, it is not easily accomplished. The difficulty is to keep the upper plane always parallel to the lower, and to get sufficient pressure upon it; for this pressure, coming from above, is only exerted at a certain point in the centre.



STANHOPE PRESS.

The flat plane, upon which the type is laid, is called the *bed of the press*. The flat plane which moves vertically and presses the paper on the type is called the *platen*. These are the two essential parts of the press.

Next in importance are the arrangements for readily bringing a forme under the platen and for withdrawing it.

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It is obvious that it would be very inconvenient if the bed were immovable. It is most desirable to have the type forme brought out from the pressing parts, both in order that it may be inked, and that a sheet of paper may be laid upon it. When, too, the latter is printed, it is desirable to bring out the forme again in order to remove the sheet preparatory to another inking of the forme and the laying on of another sheet.

These requirements led to the table being mounted upon a carriage, which ran upon two rails. A handle and an endless band are attached to the carriage, so that when the handle is turned, the carriage moves, running forward to the place where it is to receive the impression, and, on the handle being again put in movement, running back to the end of the carriage from whence it came.

Another desirable arrangement is to have some means whereby the sheet may be very accurately laid on the type. With this view a kind of leaf is hinged to one end of the bed, and the paper fixed upon it to certain marks, when it is in an upright position. It is then turned down, and the paper comes upon the type in the exact position in which it is wanted.

In the press this latter arrangement is called the *tympan*, which gets its name from being tightened, like the top of a drum. It consists of a thin frame of wood or metal over which parchment or cloth is stretched. The paper to be printed is laid upon this, and the bottom side of the tympan being jointed or hinged to the bed of the press, it is only necessary to turn it down, in order to bring the paper in contact with the type.

The annexed illustration of the Stanhope Press, reproduced from Johnson's *Typographia*, will serve to make this clearer than any verbal description. *A* is the plane or "platen" which rises and falls, but always remains parallel to the parts that come beneath it. The plane or "bed" on which the type is laid, is marked *B*. The tympan is marked *C*. The sheet of paper is laid on the side of *C*, facing the platen, and the tympan is turned down flat on *B*. The latter then travels on the two rails until it comes under

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A, and there the type forme receives the impression. The carriage is withdrawn, the tympan lifted, and the sheet removed.

In the illustration is another flap, *D*, hinged upon the tympan. This is called the *frisket*, and its use is to prevent the margins of the paper being soiled, as will be explained hereafter. After the sheet has been placed upon the tympan, *C*, the frisket is folded down upon it and both together are folded down upon the type forme.

Such is a general description of the printing press, omitting, however, that most important point, the source of the power which brings down the platen and causes the impression. This, however, will be best postponed for the moment.

In the annexed figure of the Albion Press, it will be seen that the works are supported on a frame consisting of two uprights and a cross-piece, *a a*, called the *Staple*; or sometimes only the *frame*. This, as well as the other parts, excepting some which will be named, is of iron. The staple stands on two sets of ornamented *feet*, *c c*, screwed to pieces of wood which stand on the floor. The top is sometimes called the *frame head*, *b*.

Rather more than half way down the frame there is a crosspiece, on which are laid the *ribs*, *r*. The latter are the rails on which the carriage travels. At the extremity of the ribs is the *rib leg*, *s*, which serves to steady them, and to support the weight of the carriage. Between the two ends of the ribs furthest from the staple there is the *bolster*, *t*, the object of which is to prevent the carriage running too far out, or off the rails or ribs.

The carriage is driven forward and backward by being attached by two *girths*, *u*, or strong bands of leather or cloth, to a wooden cylinder called the *rounce*, *q*. One of these girths is so fixed that it will pull the carriage in one direction, and the other so that it will pull it in the opposite, the cylinder being turned round first so that it will cause the carriage to be impelled towards the platen, and then so as to withdraw it, and send it to the end of the

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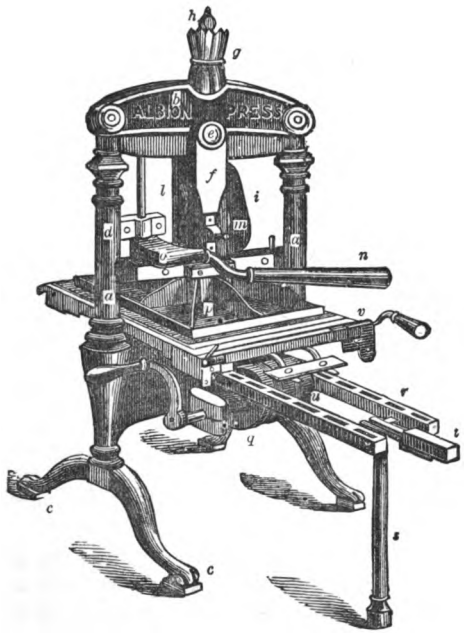
ribs. The rounce is turned by a handle, called the *rounce handle.*

The upper surface of the carriage is covered by a strong plate of iron, planed perfectly level, which is called *the table, v*, or the *coffin* or *sole.* The last two terms, how-



ALBION PRESS.

ever, were chiefly used in reference to the old wooden press, whose table was of stone, and somewhat different in construction.

Hinged to the end of the carriage furthest away from the frame of the press, is the *tympan*, already referred to. In order, however, to break the force of the descending platen, and so prevent the type being injured by the impact, the tympan is utilised to contain a soft yielding material

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such as blanket or cloth, or paper, but which goes by the name of *the blanket*, whatever it consists of. This is effected by making the tympan to consist of two parts, respectively called the *inner* and *outer* tympans. The first is a lighter frame of metal than the latter, and fits into it. The two are fastened together by *tympan hooks*. At the end of the tympan frame a heavy weight is placed, as a sort of counterpoise. When the tympan is being lifted, this facilitates the operation very materially.

Above these parts will be seen the *platen*, *p*, which is perfectly smooth and level on its under surface, in order to give the whole of the type forme an equable pressure. It is strengthened by heavy radiating plates cast in the same piece with the platen, which prevent it from "giving" in any part. The spaces between these plates, on the upper side of the platen, are called the "tills." The parts which effect the working of the platen may be divided into two classes, one regulating its descending and ascending motion, and the other being that which causes the motion. The platen, as we have already stated, must always be in a plane parallel to that of the table. It must have no lateral motion whatever. The slightest vibration, too, would cause the impression to be duplicated, and destroy its clearness; or, as printers say, would cause a "slur." Hence there are guide plates fixed into the frame, which correspond in shape with that part of the mechanism immediately over the platen.

The platen itself is pushed up and down by means of the *piston*, *f*. This is connected at one end with a system of levers, the distinguishing feature of this kind of press. The power is gained by causing an inclined piece of steel to become perpendicular. In doing so, the platen is forced down, and the impression takes place at the moment the piece of steel occupies a vertical position. This piece of steel is called the *chill*, *i*, and it is shaped like an elbow. At the other end it is fixed to the *bar*, which, on being pulled towards the operator, straightens the chill, or brings it into the vertical position, and sends down the platen. That part of the frame against which the handle elbow is brought, is called *the cheek*, *o*. The term is,

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indeed, sometimes applied to the two sides of the upright frame, to distinguish them from the head. The end of the *bar* is called the *bar handle*, *n*. The whole is hung upon the *main bolt*, *e*, running through the head of the frame.

In order to effect the return of the platen, that is, to raise it up again, there is a powerful spring fixed at the top of the press in the spring box, but obscured by the ornamental erection seen in the view. This spring is connected with the other part by links and steel bolts.

The degree of pressure given is regulated by the *pressure steel*, *k*, which is wedge-shaped, and acts upon the chill, on being screwed by the *pressure screws*, *m*, more or less forward.

The Columbian Press differs from the Albion Press in the nature of the levers which give the impression. The head itself is a powerful lever, acted on by other levers, to which the bar is attached. The platen is attached to the head by a strong iron bar, and the descent is made steady and regular by two iron girders which project from the cheeks.

In regard to the comparative merits of the two presses, a scientific mechanician, the Rev. A. Rigg, said in a paper read before the Society of Arts in February, 1874 :— "For all ordinary work the Albion is light, the pull easy, the pieces few, the mechanism simple, the wear not destructively injurious, and the work rapid. For some years the favours of the working printer were divided between the Columbian and the Albion presses. Such is no longer the case, and estimated by any other standard than that of the value of the old material, the Albion press is superior to the Columbian." * The Columbian press is, however, considered by many practical men to work lighter than the Albion; that is, to require less exertion and strength.

The person who works the press in a printing office is called the pressman. He is expected also to ink the types or *roll* them, as will be afterwards explained.

* We have not thought it necessary to describe the Columbian in detail as it differs so little, except in the leverage and its connections, from the Albion, and this difference will be understood by reading the directions to be given hereafter for setting up the two kinds of presses.

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Presses are made to certain sizes, and are designated according to the largest sheet they are intended to print. Thus, a double crown press will print any sized forme up to a double crown one. The Albion press, however, always prints one size larger sheet than it is said to be made for; thus, a double crown press will print a double demy sheet.

The following are names of the different kinds of Albion and Columbian presses, and the dimensions of their platens:—

	Inches.		Inches.
Half Sheet Foolscap	15 × 9¾	Royal	26 × 20½
Half Sheet Post	16 × 11	Super Royal	29 × 21
Half Sheet Demy	18 × 12	Double Crown	34 × 22½
Foolscap Broadside	19 × 14¼	Double Demy	36 × 23
Crown Broadside	21 × 16	Double Royal	40 × 25
Demy	24 × 18		

Quarto or Amateur presses are also made. Their platens are 10 in. × 7 in. These, as well as the half-sheet foolscap, require to be set up on a table or stand.

The best kind of Albion presses have steel chills; the second quality have cast iron chills. The bolts should be of steel, and generally the best iron should be used.

It is advisable that each press should be supplied with an extra spring, in case of accident.

Presses are made for travelling purposes in which the frame or staple, the most cumbrous part, is made in two pieces.

How to set up a Press.—Every printer should know how to set up and take down a press; not only in order that he may be able to remove different parts when they require cleaning, but also that he may clearly understand its mechanism. We will, therefore, give as clear directions for this operation as possible.

To set up the Albion Press.—Put the feet on the frame to their respective marks. Then screw the ribs on the frame with the bolts, nuts, and plates that are supplied with the press. There are two bolts and nuts for securing the rib leg and the bolster, and these must next be inserted.

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Place the table upon the ribs, and fix the rounce in its bearings under the ribs, after which suspend the piston by passing the main bolt through it and through the hole in the frame head. Next put the spring box upon the head of the press with the spring and spring bolt in it. Now connect the spring bolt with the brass links of the piston, by passing the long flat steel bolt through them. After this put in the chill and pass the main bolt through the holes at the top of the piston, passing it through the chill as well as through the hole in the frame head, which will keep the chill in its place. Put in the pressure steel with its bright side to the front; then connect the joint and rod to the chill, and then the bar handle, and secure the small staple, which has the screw and nut in it, to the back of the frame behind the elbow-piece of the bar handle, by which you will be able to stop the bar handle at a shorter pull if required. Place the platen upon the table, and put the four notched head bolts into the holes, as marked, and drive in the four wedges to keep the bolts from slipping back. Lift the platen and pass the screwed parts of the bolts through the four holes in the piston and put on the nuts. Screw down the nut on the top of the spring till it brings the bar handle back.

Let a forme now be placed on the table and run it under the platen. Make a pull with the bar handle so as to bring the platen fair with the face of the table. If necessary, put one or more of the thin square pieces of iron between the piston bottom and the top of the centre of the platen. Tighten up the four nuts of the platen bolts, a little at a time, so as to tighten them regularly.

Should the platen not come fair with the face of the table, slacken one or more of the nuts which secure the platen to the piston on that side which is farthest from the table, and tighten up the nut or nuts on that side which is nearest the table, by which means it can easily be got fair, and prevent mackling or slurring.* Should the platen and table not range fair, slacken the nuts which secure the ribs to the frame, and the ribs may be moved a little on

* *Mackling* is an imperfection in the printed sheet, part of the impression appearing double.

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either side as the case may require. Afterwards tighten up the nuts again.

The press is working to its full power when the bar handle stops against the cheek of the frame, which it should always do, particularly in heavy formes.

To clean the press, put one end of a short bar on the round part of the piston when the bar handle is pulled home, and the other end under the head of the press; then push back the bar handle, and it will leave the chill and pressure steel quite disengaged. Knock the connecting rod pin and the main bolt a little, and they may be taken out.

The main bolt should be taken out about once a week and well cleaned and oiled, which is easily done at any time. All that is necessary is to take out the pin at the back and knock it out.

The small holes which communicate with the respective bolts require a small quantity of oil occasionally, and the use of the purest Florence flask oil is recommended as the cheapest in the end. It is easy to judge whether everything is in its proper place by the perfect ease with which the bar handle moves.

In beginning to work a new press, let the impression be rather light, and increase it gradually, until such an impression as is desired is obtained. Variations of pressure are effected by means of the wedge in the chill. The further this wedge is driven in, by turning the screw, the more pressure will be obtained. If the pressure is too great, turn the screw the reverse way.

To set up the Columbian Press.—Put the feet on the frame or staple in their proper places, and erect the staple upon them. Next fix the bar handle to the side of the frame, together with its proper bolt. Put the principal lever in its place, and then put in the bolt which connects it with the staple. Put the angular or crooked part (which has one square and three round holes) through it in the mortice, which will be found in the projecting part of the long side of the staple. Now place in the bolt that attaches the angular part to the staple.

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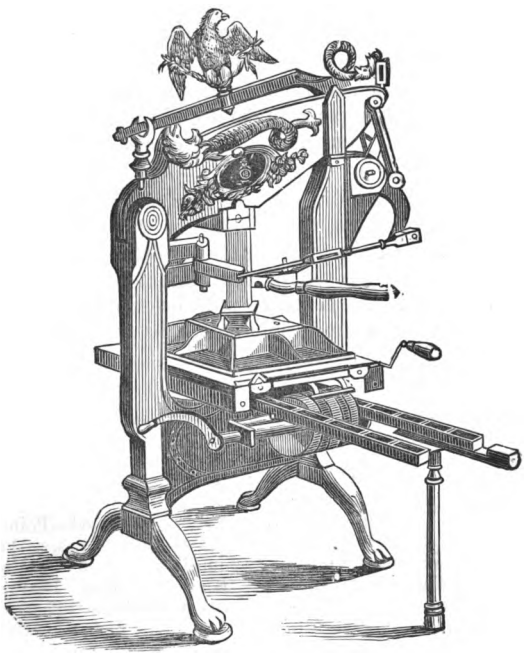
There are marks in the extremity of the edges of the heads of these two last-mentioned bolts, and corresponding marks over the holes through which they pass. Put the



THE COLUMBIAN PRESS.

bolts in so that these marks meet together and correspond; and so on, until all the remaining parts are in their respective places.

The four screws for the platen, which have heads on one side, are intended to attach the platen to the piston, which, being placed in their respective places, are secured by the four small blocks of iron, which are supplied with the press.

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To increase the power of the press, turn the nut in the rod so as to shorten it, and to decrease the power turn it the contrary way.

The ascent and descent of the platen are regulated by the nut or iron screw which connects the main and top counterpoise levers. This nut must be screwed up as is necessary to clear the tympan when the carriage is run in.

To adjust the platen so as to make it approach the forme exactly parallel, place a forme on the platen. Then square the platen to the tympans, make a pull, and hold the bar handle back,* while an assistant screws the four platen screws equally tight.

The impression may be increased by placing thin pieces of tin or sheet-iron cut to the size of the plate of iron which lies between the platen and the piston (secured by the four screws on the top of the platen), and placing it under the piston. As in the case of the Albion press, the ease with which the bar handle moves is the criterion of everything being in its place.

CHAPTER II.

TYMPANS—Best Materials for—How made and used—Points—The Frisket—Frisket Stay—Blankets—Rack Chases—Press Wrenches—Screw Hammer—Archimedian Wrench—Quoining Wrench—Sheepsfoot Hammer—Bearers—Spring Bearers—Oil Feeders—Cotton Wipings and Sponge Cloths—The Horse and Bank.

WE have already explained that the tympan consists of parchment or cambric,† stretched over a frame of iron, and tightened like the top of a drum. By means of hinges connected with the carriage, it is folded over the forme like a lid. At the two opposite corners are two nuts, which serve to keep the tympan level, and to enable a

* In printers' phraseology, "pull the bar home."

† For very fine work other materials are occasionally used, such as silk. Reference to this point will be made hereafter.

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second frame, called the frisket, being interposed between the tympan and the forme. These are called the *frisket nuts*. At the sides of the tympan frame are the *point grooves*. Both of these will be described hereafter.

This tympan is double, consisting of the inner tympan and the outer tympan. The latter of these is nearest to the type, the first to the platen. The iron frames on which the tympans are stretched are called the inner tympan frame and the outer tympan frame.

As the pressmakers or the printers' brokers do not supply tympans ready stretched on presses, as a rule, it is necessary that the workman should know how to *cover a tympan* before he begins operations with the press. The knowledge is essential afterwards, for tympans wear out, and have to be renewed according to the frequency with which the press is worked.

The materials necessary for making a parchment tympan are: 1. A pail of water; 2. A piece of parchment * of sufficient size; 3. Some good flour-paste.

Parchment is sold by the printers' brokers, cut up into various sizes to suit different presses. The characteristics of a good skin are, its uniform thickness throughout, and its freedom from imperfections or cuts. Old deeds, leases, indentures, &c., written on parchment are frequently used as tympans, as they may be had from the lawyers at a low cost. Care should be taken, however, that they are not faulty or thin at the places where they have been folded.

As *Paste* is a commodity constantly used in the printing office, it is well to know how to make it properly. The following will produce a very tenacious and durable paste, which may be used on almost any substance:—Dissolve 2½ oz. of gum arabic in 2 quarts of water, and stir into it 1 lb. of wheat flour until the whole becomes of a pasty consistency. It is then to be heated, and 1½ oz. each of

* Instead of parchment, linen and other materials are occasionally used, as has been mentioned. For all ordinary purposes parchment is the best, on account of its toughness and durability, and it is also the cheapest in the long run.

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sugar of lead and alum, dissolved in a little water, added. The composition must be well stirred until it shows signs of boiling, when it must be removed from the fire. Add while hot, 6 drops of carbolic acid. The peculiar odour of the acid may be removed by the addition of a little cloves or other perfume.

Another recipe. Dissolve 2 oz. of alum in two quarts of boiling water. Gradually put in flour, stirring it until it has a regular consistency, and is free from lumps. Boil it, but do not allow it to boil over. When cold, add water to bring it to the desired consistency. Then sprinkle in 2 teaspoonfuls of powdered rosin, and half a dozen boiled cloves. Boil for a few minutes. This paste will keep for twelve months without becoming sour or fermenting. The flour must always be put into cold water. The more the paste is boiled, the less liable it will become to ferment. The secret of making good paste is to use the best materials, and to take the utmost care in mixing and boiling.

In order to get the parchment perfectly tight, like the head of a drum, it is necessary to wet it more or less. The parchment expands when wet, and contracts again when dry.

Some pressmen saturate the tympan parchment in a pail of water, and then take it out and wring it as dry as possible. Others wet round the edges only, which we think is all that is necessary. We will first describe the manner of making the *outer* tympan.

Lay the skin so prepared on a flat board and the frame of the tympan, with the tympan hooks uppermost, on the top of it. Cut the skin to the shape of the frame, but allowing it to be about two inches larger at all sides. If a very small tympan is wanted, a less margin will be necessary.

Now cut two quite small holes opposite the tympan hooks at the bottom of the frame, through which put the hooks, and see that they afterwards turn round freely. Paste the part that extends over the frame very carefully and thoroughly with good fresh and thick paste. Cut out with a pair of scissors square pieces at the corners, in order

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that the parts which lap over may be neatly folded over the frame, without leaving thick creases at the corners. Take a paper knife or folder, and, after tucking the parchment well over the frame, smooth it in the part that is under the frame inside. Get it quite smooth and firm, without any creases. Go over it with the fingers repeatedly for this purpose.

Now operate on the opposite side of the tympan. Paste the parchment, draw it tight, turn it over, and tuck under as before. Two grooves will be observed on the sides of the tympan, which are to accommodate the *points*, as will be explained hereafter. Cut the parchment so that it can be folded over these and tucked in. Make small holes opposite each side hook. Paste both sides well, and put the hooks through, as was done in the case of the other side. The part that laps over the grooves must be put through the groove, but on each side turn over the frame, as was done at the bottom.

With the thumb and fingers, pull all the sides until the skin is stretched quite tightly. Some pressmen then tie cords very tightly in various directions to keep the skin from giving way while it is contracting; or pieces of furniture may be laid on it in different places with the view of preventing it drawing too tight.

The inner tympan is covered in the same way as the outer; but there is not so much trouble in doing it, as there are no projections on the frame. It would be well to begin to learn the art of covering tympans on the inner tympans.

If the parchment has not been thoroughly saturated, the tympan should be taken, after the paste is quite dry, and placed in the sink, and water poured over it. It will then become tight and remain so afterwards.

If the parchment has been saturated first, all that is necessary is to put the tympan by until it has become completely dry.

The whole art of covering a tympan consists in the accuracy with which the cutting out and turning over of the parchment is done.

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The parchment on the inner tympan should have its smooth side next to the forme. The parchment on the outer tympan should have the smooth side next to the platen.

When a parchment tympan has expanded by wear or through too much water being used to wash it, it may be shrunk again by heat. A piece of paper burnt close under it will nearly always restore it to its proper degree of tension.

Linen or cambric for making tympans is sold by the printers' brokers. It is very much cheaper, at any rate in first cost, than parchment, but here the advantage ends. It soon stretches, or becomes "baggy," and it is impossible to avoid what is called "slurring" when the tympan is in this condition. It is also more liable to be torn than parchment; and never gives, especially over small type, the fine sharp impression of the other.

This kind of tympan is pasted on the frame like parchment. A few stitches may be put in to secure it, or to tighten it a little when it has given way. But fine work is impossible with a textile fabric like this, and it is questionable whether it is not dearer in the long run than parchment.

The Points.—In pointing, it is of very great importance that the sheet should be accurately laid on the tympan, and in such a manner, that on the second side of each page, even each line may fall exactly on the corresponding page and line on the side first printed. To produce this effect, two iron points are fixed in the middle of the sides of the frame of the tympan, which make two small holes in the sheet during the first pressure. When the sheet is laid on to receive an impression from the second forme, these holes are placed on the same points, so as to cause the two impressions to correspond. This is termed, *making register*.

Points are pieces of steel with projecting pins, called spurs, at one end, and a square hole at the other to admit a small bolt, which is screwed by a nut to the tympan frame from the outer side. These nuts work in grooves

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in the sides of the tympan, called the *point-screw grooves*. There are two kinds of points, called respectively *spring points and elbow points*.

The Frisket.—In order to prevent the sheet falling off the tympan while it is being folded over the forme, and to prevent, also, the sheet being inked or soiled in places where it might come in contact with the furniture or the chase, a slender frame is placed over the tympan, and this frame is covered with paper, cut out in the middle, to the size of the forme, or rather of the printing surface. This frame is called the frisket. It is hinged to the upper extremity of the tympan. Thus, the frisket is first folded down over the tympan, and the tympan next folded down over the forme.

To avoid the trouble of cutting out *frisket sheets*, elastic bands are sometimes extended from one side of the frame of the frisket to the other. Sets of bands may be had, fitted with small brass catches at the ends. Strings run across and fastened to the sides of the frisket serve the same purpose.

A projecting piece of wood is generally fixed upon the ceiling or the wall, in order that the free end of the frisket may rest upon it when it is "up." This is called the *frisket stay*.

Between the two tympans are placed *the blankets*. These consist of pieces of woollen material, something of the nature of the domestic article so called, but of at least two degrees of softness, called "Fine" and "Stout." They are sold in pairs, being cut to the different sizes of presses. Their office is to prevent the metal of the platen coming into contact with the type metal, and so crushing it. Hereafter we shall have to point out the most suitable kinds of blanket for different kinds of work.

Instead of woollen blankets, sheets of paper, pieces of pasteboard, &c., are sometimes advantageously used. This point, also, will be referred to subsequently.

There are several accessories to the press which will require notice here, although the mode of using some of

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them must be referred to hereafter, when practical press-work is treated of.

Rack or Locking-up Chases are laid on the bed of the press, and the chase containing the forme is placed inside them. The chase and its contents may be said to be locked up, as the type-matter itself was, in the first place, locked up in the chase. The use of furniture on the bed of the press is thus dispensed with, and a great source of danger avoided. Chases are made to fit various sized presses; the bar and side-stick should be of wrought iron. An illustration has been given on page 67.

Press Wrenches are used for turning the screws and some other moveable parts of a press. They are of various shapes. The *double-ended nut*, or ess [S] wrench is most frequently used in the press room. The *bright tommy wrench* is used in cases where less power is required to be exerted than when the ess wrench is brought into requisition. The thinner end is used for turning round nuts which have holes in their circumference, and cannot be moved by a square grip, like that at the other end.

The Screw Hammer is one of the most useful appliances in the press room. The head is made in two pieces, connected together by a short rod, which is acted upon by a screw in the handle. When this screw is turned, the two parts of the head approach or recede from each other, and hence may be made to fit any sized nut. When they are adjusted, a screw is turned, the hammer-head is fixed, and the nut, however obstinate, may be moved.

The Archimedean Wrench is of a similar nature to the screw hammer, but contains fewer pieces, and the adjusting screw is embedded in the head. It does not, however, exert as much power as the previous one, although it can be applied more quickly.

The Quoining Wrench is for removing quoins that have "stuck" and cannot be driven back by the mallet and shooting-stick.

The Sheep's-foot Hammer is simply an iron hammer with a claw end, which is used as a lever for prizing asunder quoins that have come together, &c.

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To bear off the pressure exerted by the platen on the edges of the forme, and for other purposes which will be described in the chapter on "making ready," *bearers* are used. They are long strips of wood, type high, placed along the sides of the carriage. Wrought iron bearers of various lengths, type high, and planed to a perfectly true surface, have been introduced; they are superior to wood, from the fact of their not being liable to warp, and are more durable and easier cleaned. Other kinds of bearers are improvised out of pieces of cork, strong paper rolled or folded up, reglets, &c., and these will also be noticed hereafter.

The Spring Bearer, or *Tympan Bearer*, consists of a wooden base, and a small piston in the middle; this has a stout spring underneath it, which is embedded in the base. No adjustment of its height is necessary. This kind of bearer is apt to get out of order, and the spring to wear away rapidly; but it sometimes effects a considerable saving of time in making ready, and assists in bringing off a clear and sharp impression.

Oil Feeders are of various kinds. Some of them have a circular groove round the base of the spout, by which the drops are caught and returned into the can every time it is used.

The oil is removed from parts of the press where it is not wanted, and would only serve to collect and retain dust and dirt, by *cotton wipings* and *sponge cloths*. In some offices wisps of paper are used, which is a very dirty and wasteful practice.

The cloths and wipings also serve to polish the bright parts of the press; the black parts ought to be occasionally touched up with good brunswick black. If the press is kept well polished and blackened with brunswick black, it will not only testify to the care of the pressman, but avoid rust and remain cleaner.

The paper, to be printed on, is laid in a pile on *a bank;* otherwise, a deal table, which stands at the side of the press. It is usually 3 ft. 4 in. long, 22in. wide, and 3 ft. high. About five inches from the bottom, a board is

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placed, within two inches of the length and breadth of the bank, and fastened to the legs. It serves as a convenient shelf upon which the pressman can lay his printed or *worked off* heaps.

The *Horse*, which receives the damp paper, or the *white* paper to be printed off, is the desk-like object at one end

BANK AND HORSE.

of the bank. It is made of deal, is 2 ft. 2 in. long, and 24 in. wide. The body of it forms an angle of about forty degrees, but six inches of the back rise almost vertically.

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CHAPTER III.

INKING APPLIANCES FOR THE HAND PRESS—Ink—Brayer Ink Table—Cylinder Ink Table—The Slice—Palette Knife—Ink Slabs—Balls—Rollers—Apparatus for Casting Rollers—The Melting Kettle– The Moulds.

THE art of letter-press printing consists in coating certain surfaces in relief with a composition called *ink*, and then by pressure transferring that ink to the fabric, such as paper, which is to bear the image or fac-simile of it. The relief surface is formed by moveable types and engraved blocks, which for our present purpose may be regarded as the same thing; the impression is effected by the press already described. We have now to show how the ink is applied to the printing surface, and to describe the apparatus necessary for the operation.

Black printing ink, with which only we are now concerned, is a composition of lamp black, or other pigment, and oil, of sufficient tenuity to be readily spread out in an even coating on any surface, but not sufficiently liquid to "run," or make blotches. So marvellously thin is the layer of ink on small type, that one pound weight even of cheap newspaper ink will cover no less than 7,000 square feet of type matter.

This ink is supplied to the printer in cans or metal drums, containing from half a pound upwards. After the can is opened, the manipulation of the ink commences.

First of all there is required an *inking table:* there are several varieties.

The Brayer Inking Table may be made of iron or wood. It is so called because the ink is spread out upon it by a *brayer*, which is a rubber of wood or

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glass, and is flat at the bottom. This is sometimes called a *muller*.

BRAYER INKING TABLE, WITH ROLLER.

Where very large quantities of ink are required to be spread out on the table, an *ink slice* is sometimes used. It is made of iron, and shaped something like a gardener's hoe.

The Cylinder Inking Table.—The ink is contained in a receptacle called a fountain, one side of which is moveable, and can be adjusted by set screws at the back. This moveable side consists of an iron cylinder which is made to revolve by a handle at the side. The cylinder turns round in the ink, and receives at each revolution a certain amount of it. The inking roller is merely run up to the cylinder, until it gets a portion of ink, and there is no braying out required. The parts containing the ink are covered over with a lid to exclude dust. Taking ink is certainly a more cleanly operation when this kind of table is used, than when only the ordinary brayer is used, but many printers believe that on the whole the latter kind of table is preferable.

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For mixing different kinds of inks, and occasionally for other purposes, a *palette knife* is used. It has a long flexible blade, which is not sharpened at either side.

Metal being injurious to many kinds of coloured inks, even a polished iron surface causing bright colours to be dull in printing, *slabs* of various kinds are used, which are laid over the table. Porcelain, lithographic stone, marble, and slate may be adopted. The last-named, if firm, is equal to marble, but it is open to the objection—which, indeed, applies to some of the other kinds—that it cannot be heated, with the view of making the ink thinner, so as to work better in cold weather.

Printing ink is taken from the inking table and applied to the surface of type formes by *balls* and *rollers*, covered with a certain *composition*. The ink is readily distributed over the surface of these balls and rollers; the composition being elastic adapts itself to the surface of the type, and readily imparts the ink. A full account of ink and roller composition will be given hereafter.

The Printer's Ink Ball, which is now very seldom used, consists of a semi-globular pad, coated with composition. This is fastened to the *stock* by strong nails, and a *handle* is added for ease in working, and to prevent the hands of the workman being soiled.

The Roller consists of a wooden cylinder, covered with composition. The cylinder is set in an iron *frame*, which revolves on two pins forming axles, projecting from each end of the frame. The frame is furnished with one or two handles, according to its size.

Shifting or *Telescopic Roller Frames* are made of iron; they are in two parts, and can be extended or reduced at will. They are supplied with screws and clamps to fasten them together when adjusting. By their use the same frame will do for various sized rollers.

In the large towns rollers can be had ready made or "covered," and it is both convenient and economical to get them so. But in other places this accommodation is not accessible, and as every pressman ought to know how to make a roller, we now describe the process. The young

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printer, however, may pass by this chapter for the present, and go on to the preliminary instructions about press work proper.

The *appliances for making rollers* are few and simple, consisting of the roller mould and the melting kettle, with a few utensils, such as are found in ordinary kitchens.

The melting kettle is merely a metal pot, shaped something like the French *pot au feu*, and is in construction similar to a common glue pot. It is double; the lower and outer portion containing water, and the inner and upper one the composition that is intended to be melted. The latter would burn, and not melt gradually, if brought in contact suddenly with the heat of the fire, which the water moderates and causes to act gradually and slowly. At one side of the inner kettle (which projects above the outer one) is a spout, so that its contents, when melted, may be readily poured off. The lid has a hole to accommodate the stirrer, which is merely a piece of wood used, from time to time, to agitate the mass within. Both outer and inner kettles are provided with handles on each side.

A melting kettle may, however, be entirely dispensed with. The composition can be placed in a large jug, and this may be placed in a saucepan, with just sufficient water to reach half-way up. This will almost do as well as a proper kettle, but a piece of old plate or something of the kind should be put at the bottom of the saucepan, lest the jug should crack through coming in contact with the hot bottom of the saucepan.

Roller moulds are of two kinds, open or *split* roller moulds and *tubular* ones.

Split Roller Moulds are made in two parts, which fit closely together, and are kept in contact by strong iron clamps, or (as they are called) dogs, secured with screws.

The advantage of this kind of mould consists in the readiness with which the roller can be withdrawn after it is cast. There is a counterbalancing disadvantage, however, in the fact that rollers cast in such moulds invariably have a seam projecting from their surface, corresponding

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to the part where the two sections of the mould come together. This seam becomes, as the tube is used, continually more prominent, and materially interferes with the quality of the roller.

Tubular Moulds consist simply of tubes, perfectly true and polished on the inside. They should be proportioned to the size of the roller to be cast. A mould, for instance, 18½ inches long, should be about ⅝ of an inch thick and 1½ inch diameter. Moulds of this kind are supplied with several printing machines. They are made of cast iron, and are very smooth.

Roller moulds are sometimes made of brass, instead of iron, but their prime cheapness is their only recommendation. The printer will lose in the end by purchasing them, except for very small rollers. Zinc tubes should on no account be used.

CHAPTER IV.

ROLLER CASTING—The Composition; Various Recipes—The Glue—Proportion of Syrup—Filling the Mould—Drawing the Roller—Trimming the Roller—Ascertaining whether Ready for Use—Re-casting Old Rollers—Separation of Ingredients—"Vamping-up" Old Rollers.

IN some of the large towns, as already mentioned, rollers are cast for the use of printers by firms who make that a speciality of their business, and rollers are renewed whenever necessary, on payment of a fixed sum per quarter. As, however, it ought to be an essential part of every pressman's qualifications to know how to cast rollers, we present the following information on the subject.

In describing the method of casting rollers, and the composition of the material, we would have it understood that in general we do not recommend printers to attempt to mix up the necessary ingredients themselves. It is as economical and as convenient to obtain ready-prepared composition as to use the black and other inks supplied by the special manufacturers; the time being gone by when

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it was worth the while of the printer to make either his inks or his roller composition. It will, nevertheless, be convenient to printers at a long distance from the metropolis to know the exact ingredients with which rollers may be made.

In regard to these special roller compositions, it may be said that while all are agreed as to the convenience of adopting them in preference to the old glue and treacle, &c., the opinions of printers are much divided as to their relative value. We do not intend to pronounce upon the superiority of any, partly because none, perhaps, come up to the ideal of a *perfect* composition; yet nearly all have some especial merit which may be as valuable in particular cases to printers as to outweigh some minor disadvantages.

It may be well to set out here the points which should characterize a good composition, when applied to a roller.

1. It should not shrink.
2. It should not become hard in cold weather, nor soft in hot weather.
3. It should retain its "suction," or "tack," or "lug."
4. It should preserve a good "face," and neither "skin" nor "crack." (The meaning of these terms will be explained presently.)
5. It should require washing only very seldom.
6. It should be capable of re-melting readily.
7. It should be tough and durable, and stand wear and tear.
8. It should take up coloured ink readily, and give it off freely and without waste.

We will now give some recipes for roller making.

Recipe No. 1.—Glue..... 8 parts (*estimated by*
Treacle ..... 12 ,, *weight.*)
Paris White..... 1 ,,

This is a good old-fashioned recipe. It should be made up as directed for No. 3, except that good ordinary glue will suffice.

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Recipe No. 2.—Glue..... 10 parts
Sugar ..... 10 ,,
Glycerine..... 12 ,,

The sugar should be refined, but not sharply granulated. Soak the glue twenty minutes in water ; turn off the water as dry as possible ; cover in a closed vessel until thoroughly soaked through ; melt ; add glycerine and sugar, and boil until the water is as nearly out as possible. The core and mould, when used, must be hot. If haste is required, the glue may be soaked ten minutes, melted at once, and glycerine added, when the composition should be strained through a coarse wire sieve to take out the unmelted glue. Then add the sugar.

Recipe No. 3.—(Hansard's.)
Glue ..... 4 parts
Molasses or Treacle ... 12 ,,
Paris White ..... 1 ,,

The glue to be made from the cuttings of parchment or vellum. Put the glue in a little water for a few hours to soak ; pour off the liquid ; put the glue over the fire, and when it is dissolved add the molasses and let them be well incorporated together for an hour at least. Then with a very fine sieve add the paris white, frequently stirring the composition, which will be ready for pouring into the moulds in about an hour.

Recipe No. 4.—Glue..... 3½ parts
Best Golden Syrup 6 ,,

Break the glue into small pieces, and put it to soak for about six or eight hours. This being done, put the glue into a sieve to drain for a short time, after which put it into the melting pan and place it on the fire. When it is perfectly melted,* add the treacle and let them boil together, and be well stirred for about three hours.

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* If there are any pieces of glue that will not melt, take them out or they will make the roller lumpy.

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Much depends, in any recipe, on the quality of *the glue*. It should be clear and bright in body, and even in texture, when held up to the light. It should break short, but only after considerable force is used, and with a clear, sharp edge, like glass. Spotted and cloudy glue should be refused.

The glue should, generally speaking, be taken out of the water when it is half penetrated by it, and then put aside for a few hours, until it has the consistency all through of leather or gutta percha. Cologne glue is in thick slices, and requires sometimes three or four hours to soak. Much depends upon the temperature of the weather at the time.

The water in the outside vessel should not be allowed to boil, but be maintained nearly at the boiling point.

Stir the composition thoroughly from time to time with a stick. When properly melted it will freely run off the stick, but hang in strings when the stick is held up. To try it further, take a little out on a piece of paper, and when cool, if it is tough, so as to resist the action of the finger without feeling tacky, it is ready to be cast.

An experienced roller-maker says:—"No specific rule can be laid down as to the proportions of glue and syrup. As the thermometer approaches zero, the proportion of syrup must be slightly and gradually increased, as practical experience suggests; as it approaches the nineties, the proportion must in like manner be decreased. For a temperature of sixty-five to seventy degrees, let the proportion be one pound of glue to one quart of syrup."

Filling the Mould.—Having procured the tube, clean it out with hot water and old linen rag; then oil it just sufficiently to show the smear of a finger. A great deal depends upon having the mould well cleaned and properly oiled before using it. A mop is best for the oiling, and one should be kept specially for each tube. It should be passed up and down the mould. The stock of the roller must now be adjusted firmly in the mould, the end pieces placed in position, and the whole turned up perpendicularly. If the stock has had a roller upon it before, strip off the old

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composition with a knife, and scrape the surface. Keep water away from it, and also the hands, if they are damp with perspiration. If water is used at all, let it be hard water, and let the stock dry thoroughly before casting. If the composition has been known to peel off the stock, brush it over with lime-water newly made with quicklime, and let it dry well. The upper end of the stock should be very open, to allow the composition to pass down between the interior of the roller and the stock. The stock must be well secured from rising before the composition is poured in, by placing a stick upon the end of it sufficiently long to reach above the end of the mould, and tying it down with twine. The composition, hot from the kettle, should be poured in very slowly upon the end of the stock, and in such a manner as to cause it to run down one side of the stock, allowing the air to escape freely up the other. The composition must not run down the inner surface of the mould, as that would be likely to take off the oil from the mould, and by flowing it against the core would make it peel off when cast. The composition must be filled up to an inch more than the length of the roller.

If the mould has been filled at night, the roller may be drawn out next morning; but it should always stand a few hours before being removed. It may stand even a dozen hours, but if left much longer the metal may cause holes in the roller. Whatever the time necessary, the roller should stand in a dry, cool place.

Drawing the Roller.—This is the great difficulty when tubular moulds are used, and more rollers are destroyed in doing it than from any other cause. No one who had not actually witnessed it could imagine the tenacity with which a roller will "stick" to the tube. If the tube is too thin, it is in fact almost impossible to get the roller out. A correspondent says:—"I have seen three men, with the aid of a gun-tackle purchase, unable to force a roller 18 inches long and 1½ inch diameter out of a thin tube." The beginner is disposed to facilitate the removal of the tube by the application of boiling water; but this absolutely and completely destroys the roller for ever.

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The following are two simple and practical methods, which may suggest others:—

Method No. 1.—Place the roller mould against an ordinary screw press (for pressing sheets), with a piece of wooden furniture or a mallet handle resting on the roller stock at one end, and the top of the press at the other. Hold the mould and furniture firmly, and get someone to screw the press down. The pressure thus brought to bear on the roller will cause it to move in the mould, and it may afterwards be easily forced out with a piece of wooden furniture.

Method No. 2.—Get a piece of wood a little longer than the roller stock, mortice into both ends pieces of hard wood a few inches high; through one cut a hole with a centre bit the size of the roller, in the other insert a screw—a bed screw will do. Place one end of the mould against the hole and apply the screw to the stock of the roller. A turn or two will start it, it can then be removed without difficulty.

Roller stocks should always be kept well painted, to prevent the composition coming off in use.

Trimming the Roller.—As the composition extends over the ends of the stock, the roller requires to be trimmed. The spare stuff may be cut off in this way: Encircle the end with a piece of thin cord or fine wire, and pull each end of the cord or wire till the composition is cut through. Then dip the eighth of an inch of the ends into hot water. This will melt a little of the composition, and not only give the ends a more finished appearance, but tend to prevent the stuff coming off the stock, by preventing water, lye, or oil from getting in between the composition and the wood, and making it peel at the ends.

Another way is to trim the ends with a sharp knife, making them bevelled towards the core. Then take a hot iron and run it around the ends of the composition, thus soldering it to the stock.

General Hints.—Good rollers cannot be cast except in perfect moulds.

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Composition that is too thick may be thinned by the addition of a little old ale.

A good oil for use in the moulds is thus made: Put a pint of olive oil into a clean glass bottle; twist up a thin piece of lead into a spiral form (like a wood shaving, or a corkscrew) and suspend it in the oil by means of a string attached to the cork. Hang the oil thus prepared in the sunlight for one month, and at the end of that time the impurities will have settled at the bottom; then decant quite clear. This is the colourless oil used by gun and watchmakers: it has the property of remaining pellucid. If a little paraffin is added to it, it forms an admirable lubricator for machines.

Some printers mix the oil for lubricating the mould with lampblack, as the latter serves to keep the oil well distributed.

If a roller is ragged or flaky when first cast, it may be washed with water until smoothed, or the defective spots melted down by the aid of a lamp. But this is a clumsy expedient, for a roller that is worth any trouble at all will be as smooth in appearance as polished and turned ebony. A composition or a mould that does not give a smooth roller should not be used.

Much of the difficulty of drawing rollers arises from the kind of oil used for the mould. The common olive oil is perhaps the worst that can be selected, having a stronger chemical action on the metal than almost any other, which is the reason it cannot be used for the finer kinds of machinery. Sperm and lard oils are the best for the purpose, being the least disposed to clog. The use of sperm oil will obviate much trouble and the loss of many rollers.

The roller mould ought always to be kept perfectly clean and free from rust. The reasons are obvious.

After the roller is cast and trimmed, it should be put away for a few days. Every printing office ought to contain a roller cupboard, in which all kinds of rollers may be kept protected from sudden vicissitudes of temperature, as well as from dust floating in the air. The roller composition should not be allowed to come into contact with

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any substance whatever, and should be supported on bars running through the core of the stock. The roller cupboard should be of the same temperature as the press room, hence it is best when the cupboard is fixed there. Sudden changes of temperature, as from a cold cellar to a warm press room, will soon injure them, and prevent them working a proper length of time. Air should be admitted to the rollers through small holes in the bottom of the lid, otherwise they will suffer from mildew.

The mode of ascertaining whether a roller is ready for use is this: It should be moderately soft to the touch, yet perfectly elastic and strong in texture. Grasp it gently with the hand, or pass the ends of the fingers along its surface lengthwise. If it is in a raw, sticky condition it must not be used; it is then said to be "green." If it appears only moderately adhesive and pliant, but uniformly so, escaping from the fingers without showing an indention from them, and with a smooth rebound, it is in proper condition for working.

Do not wash a roller when it is taken from the mould; it will be all the better for two or three days' seasoning, with the oil on the surface.

It is always good economy to have sufficient rollers cast in advance, so as not to be obliged to use new ones until they are seasoned.

Re-casting Old Rollers.—The old roller should be first of all sponged with hot water, and the face scraped off thoroughly with a knife. Then draw or drag the composition off the stock, and cut it up into small pieces. If the roller has been used only a short time, the composition may be melted about as readily as new composition; if it is older, put it in a sieve or basket and soak it in cold water for about fifteen or twenty minutes. Take it out of the water, cover with a damp cloth, and leave it overnight. It is then ready for being melted in the usual manner.

If the composition is too hard, wait till it is melted, and stir in a sufficient quantity of common molasses. Avoid heavy, clarified syrups.

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Generally, not more than one-fourth of the old stuff may be added to the new; but this does not apply to the special preparations of compositions, which are to be treated according to the particular directions of their makers.

All composition becomes deteriorated by frequent meltings. If the roller be too hard, more syrup and a little less glue may be added to the old; if too soft a little more glue may be all that is necessary.

The ingredients of rollers may often be separated in the following manner: "Wash the rollers clean, dissolve them in hot water, cool them down until the hand may be inserted without inconvenience into the mass; fill a pail half full of it, and then with a wooden stick stir or beat the composition briskly about; by degrees beat more gently. In doing so a continuous new surface is created in the fluid, the glue will come constantly in contact with the cool air on the surface, and will first chill on the stick and surface in threads. By degrees all the glue comes to the surface in the shape of a chilled cake, which afterwards may be removed or strained through a sieve or piece of rough canvas. The remaining fluid will be treacle and water only. A pail half full will take about twenty minutes to separate. The method requires practice, but anyone may get expert at it in time."

There are two methods of "vamping-up" old rollers, which may be named here, although we strongly disapprove of the necessity for using them.

A new face may be put on an old roller by washing the latter well with turpentine, and then holding it at a distance from a fierce fire, but continually revolving it till the face is all evenly melted. The roller must then be taken from the fire and again kept revolving till the face of it becomes set, otherwise it will run itself uneven and be consequently useless.

Old rollers that are still elastic, but surface-hardened, may be renovated by shaving off the tough parts to the depth of a third of an inch, and after placing them in the mould pouring around them fresh composition made thoroughly hot. This "dodge" is practised by some of the

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professional roller casters, and explains why so many rollers get used up so soon.

Surplus composition should always be poured into pans for future use, and when required should be melted by itself. Mixing old and new composition in the melting kettle is unadvisable ; melt each separately.

When composition becomes rough and stringy from too much boiling, the addition of a little treacle will generally reduce it sufficiently to pour well into the mould.

Boiling glue and treacle together too much is apt to take away the useful properties of both. The treacle candies, and the glue becomes dry and leathery.

CHAPTER V.

ROLLERS, AND HOW TO USE THEM—Adaptation to different varieties of Jobs—How to make them Last as long as possible—The practice of "Smothering"—Damping Rollers, when they should be Washed—The Abuse of Lye—Benzine as a Roller Wash—Oil and Lard—Defects of Rollers, and their Remedies—Preservatives for Rollers—Miscellaneous Hints—Substitutes for Treacle and Glue Composition.

THERE are two general rules for the use of rollers, which must always be borne in mind :—

1. A large poster or newspaper forme, or any large forme with old type, will require a *soft* roller, and one with much suction.
2. Book-work, woodcuts, or fine job work, require a *hard* roller, with a very smooth, elastic, and clinging surface.

The suitableness of a roller cannot, however, be expressed in words ; it is only by observation and experience that the pressman knows which is the best roller for the job in hand.

Again, if the roller is too fresh, its return is apt to partially take the ink off the edge of the forme, and to

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make irregular deposits of ink in various parts of large engravings. A certain amount of "clinging" is nevertheless desirable, in order that the entire surface of the forme of type or plates may be covered, especially if a little worn. This suction is called "tack" or "lug."

If the roller is too firm, the deposit of ink is never so clean and clear, though the edges of the forme do not suffer, as with the fresh rollers.

In machines, where three rollers are worked together, it is a good plan to put a roller of medium hardness in front, a soft one in the middle, and a hard one in the rear.

To keep up their proper suction, rollers should be frequently changed during the day. Hence it is necessary to have at least two sets; a third set would be all the better.

Considering the great expense of rollers, every care should be taken to make them last as long as possible. With care, rollers may be made to last for months. After working they should be wiped down with a rag dipped in lye, and when all the ink is removed, well rinsed in cold water, or, in winter, tepid water. They should then be wiped with a clean dry sponge, so that no moisture remains on the face.

A little oil—neat's foot or sweet oil—smeared over them when not in use, will help to keep the face in good working order.

Some printers "smother" or "ink up" their rollers by covering them with a great quantity of old or dirty ink. This is a very bad plan; the "driers" often put into the ink cause the face of the rollers to harden and become stiff, for it is obvious that printing inks are made to dry, whether on paper or rollers. They are then said to "skin."

The process of ink drying on the roller can be retarded by rubbing melted tallow, oily ink, or glycerine on the roller before it is put away. A kind of ink is made called "roller ink," which does not contain dryers, which is said to protect the roller from the effects of the

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atmosphere. But, as we have said, we do not believe in the utility of putting ink on rollers for this purpose at all.

If the roller has been inked up, it must be carefully scraped with a blunt knife before being used again. The "roller ink" may be kept for future use.

Some printers put their rollers away in a box containing damp sawdust, and slightly sponge them before using them again, claiming that when treated in this way the rollers last longer and do much better work than if ink were allowed to harden on them.

In several offices the rule is not to clean off rollers after they have been used, but before they are wanted again. After being used for a job, they are covered with very weak or oily ink, which is spread out on a board expressly kept for that purpose, on which all the rollers in the place are rubbed in the evening, and scraped off before beginning work in the morning. The scraped-off ink is put back in a place by itself.

The best knife to be used for this purpose is said to be one in a half-circle form, and not sharp.

Most rollers are spoiled in *washing*, a process to which we must direct the especial attention of the printer.

Clumsy workmen, when they want to wash a roller, first of all dash on a quantity of strong lye, and then commence rubbing it vigorously. Of course, this soon causes the ink to begin to dissolve, and with it the face. They then saturate the roller with water, give it a few wipes with their hands, and stand it up on one side, in the belief that they have finished the job.

The effects of this washing and wiping are, first of all, that drops of water are left on the ends and on the face of the roller, which not only loosen it from the stock, but "blister" its surface. Further, water left standing on a roller has a tendency to absorb and evaporate the best properties of the treacle in the composition, and in a short time the roller begins to crack and shrink.

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There are several methods of cleansing a roller, each of which has its adherents, who consider it better than any other. We will repeat some of the methods.

Benzine is, by some, regarded as the best roller wash: first, because it cleans the roller much better than any other wash; because it does not cause the pressman to lose time in waiting for the rollers after being washed, as it evaporates almost immediately when used; third, it costs very little; and last, it does not deaden and cause coloured inks to spread, as oil is said to do. Lye, indeed, should never be used for fine coloured inks.

On the other hand, it is contended that benzine rots and cracks the face of the roller. It is replied to this that such does not occur when the benzine is properly used. It only rots the composition when allowed to remain on the roller after washing.

The mode of washing with this fluid would be as follows: Get a trough with rods stretched across it. These rods should be run through the core of the stock, and may be supported on the sides of the trough. Then, with a soft sponge or rag, apply the benzine, rubbing gently but firmly from the ends the full length of the roller; not, as many do, from the centre both ways, thereby washing the centre twice as much as the ends, and soon making the roller so hollow as to be worthless. After having thoroughly loosened the ink from the roller, with a sponge damped with clean water, wipe the benzine from the face of the roller, and finish by removing from the ends any drops of water or benzine that may have collected thereon. If the roller is small, stand it on one end and wash down the full length.*

This mode of washing a roller has come into vogue in some of the large offices, because it is quickly performed, and the roller can be used almost immediately. It is, therefore, undoubtedly a very convenient one; but whether it is the best for preserving the sensitive surface of the roller is another matter altogether. We fear it has a tendency to impart a parchment-like skin to the

* Instead of benzine, naphtha may be used.

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roller, that must materially affect the transfer of the ink to the forme surface when good work is required. If so, it is only a degree less objectionable than the old-fashioned lye, which eventually eats through the skin.

A plan not open to either of these objections is to wash all fresh rollers with oil. Even when the rollers can be no longer called fresh, this plan may be followed. After so washing them, let them be thoroughly cleaned and rubbed with cotton waste, till the last particle of oil is removed. The process is not an agreeable one, but the dirtying of the hands is compensated by the protection and preservation of the roller. A little soap and water will remove the oil from the hands.

As the roller gets older, the naphtha or benzine wash may be tried; but care should be taken to finish up with clean water, and to use the rollers, not at once, but when in proper condition.

When rollers are really very hard, it may be admissible to wash them with lye; indeed, this is sometimes done with great advantage. Water must be copiously used, and every trace of the lye washed away.

An eminent firm of roller makers says:—"Washing should at first be avoided, but when the 'lug' becomes less sensitive, the rollers may be washed about an hour before they are required, using as little lye as possible, which should be well rinsed off without delay with *cold* water, as the effect of the alkaline salt on the composition is very injurious, hardening its surface, impairing its 'lug,' and ultimately destroying the ingredient that produces the peculiar qualities for which composition rollers are distinguished. *Hot* water should also be avoided, as it makes the rollers unfeeling, by depriving them of the saccharine substance which forms an important part of the composition."

Another way of cleansing a roller, and one which may be adopted if it is getting hard, is to let it be rolled in dust, which must be washed off with a piece of woollen cloth and clean water. This method is better than using lye, and preserves rollers from cracks much longer.

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A readier way, also useful when the roller is new, is to scrape it, after it has been well covered with fresh lard. It must be rolled on a dry sheet of waste paper until it is perfectly clean, especially about the ends.

The principal *defects* of rollers are the following:—

1. They may be too hard.—*Remedy.* If too hard from the beginning, they must be recast again, and less glue used. If from the effects of cold, warm them in front of a fire, turning them round all the time. If from being too old, recast them.
2. They may have a skin over the face.—*Remedy.* Rub them with a damp sponge five or six minutes before they are wanted.
3. They may be too soft or "green."—*Remedy.* Hang them up again, or wash them once in spirits of turpentine.
4. They may be too dirty, and cannot be properly cleaned in the ordinary way.—*Remedy.* Slightly warm the face before the fire, and put a little oil upon them while warming. Wipe the oil and hard ink off, and wash the face well with turpentine.
5. They may be "greasy," and make friars.—*Remedy.* Rub them with a mixture of spirits of turpentine and water, or a little pearl-ash lye.

A "preservative" for rollers which have been well washed with lye is thus compounded:—

Corrosive sublimate.....	1 drachm
Fine table salt.....	2 ounces

Put them together in half a gallon of soft water, and let the mixture stand for twenty-four hours. The rollers may be sponged with the above twice a week.

Compounds for a similar purpose are the following:—In very hot weather a solution of powdered alum in cold spring water is very serviceable in sponging up rollers after the ink has been washed off them, and when they are hung up for the night or the dinner hour.

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During hot weather they may also be placed in a damp blanket, wet sand, or soaked sawdust, but they must be properly cleaned previously. Stale beer is also used for "coaxing up" rollers.

A plan adopted in America, when rollers become somewhat dry and skin-like upon the surface from long use or from remaining out of use, is to revive them by damping them with a decoction made from once-used green tea leaves reboiled until the water assumes a greenish russet hue. This should be kept in a bottle, and is said to be much better than water for damping rollers, causing them to retain their faces longer.

General Hints.—More rollers are washed out than worn out.

A roller should never be put to press covered with dust or dirt of any kind.

Where sponging has been held to be necessary, see that the water has been properly removed before the ink is applied; for water remaining on the roller will cause it to tear, and prevent a perfect distribution of the ink.

For black inks, rollers should have a more adhesive face than for coloured inks. The hardness or softness of the roller will depend much upon the body of the ink, and even the quality of the paper to be printed on. Rollers used for coloured inks require a firmer face than those used for black. They should never be sponged just before going to press, as water deadens coloured inks, and causes many—especially vermilions—to precipitate on the forme. Where much coloured ink is used, a set of rollers should be kept exclusively for that purpose; not only because such inks require a tough, clinging face, but for the reason that a roller which is used for black cannot be washed sufficiently clean to prevent it from tinting reds and other lighter shades of colour.

If the colour is vermilion, chrome yellow, prussian blue, or contains a strong varnish or size, it should *never* be left on the roller. These inks are very quick driers.

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The general effect of moisture is to *rot* the composition; while the air causes it to *shrink* and *crack*.

From the preceding it will be seen that the importance of washing a roller properly does not arise so much from the necessity of having it thoroughly cleansed, as from the way in which the process will affect the roller afterwards. Upon the mode of washing, in fact, will depend very much the extent of the usefulness of the roller, in preserving its suction, or, on the other hand, impairing or utterly destroying it.

Of the several ways of removing the ink, it may be said that each is good if done properly. The old plan of covering the roller with dust, and rubbing off the ink and dust together with a wet rag, had its recommendations. The use of lye may also be defended on the ground that it is cheap, convenient, and always at hand in solution, as it is used for washing type. Benzine, turpentine, and oil have their adherents, and good reasons are alleged for the use of each of them. But it should be remembered that whatever liquids are used, their strong natures render them injurious if they are allowed to remain too long on the face of the roller, which is essentially delicate. Hence, if any of these are used they must be applied very quickly, and when the ink is dissolved, rinsed off as soon as possible, before the roller can sustain injury.

In the different methods stress is laid on the importance, after rinsing, of wiping the roller dry with a sponge or cloth. The rinsing should be done with *clean* water and a *clean* sponge. Very often the same cloth or sponge that has been used to wash with is slightly squeezed and used in rinsing. This is only applying more lye or other chemical, only it is a little weaker, but still strong enough to do injury by destroying the suction, cracking the face, and shortening the term of usefulness of the roller. Similar bad effects ensue from only partially rinsing when benzine, turpentine, or oil is used. In each case clean sponging will prevent bad effects, and should by no means be neglected.

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In the "Roller Guide," by Mr. C. P. Stevens, of Boston, we find the following:—"Never use lye upon new rollers. Very many rollers are often spoiled by inexperienced workmen, by washing them in lye when new. They will then wonder what is the matter with their roller, and blame the roller maker for what is their own fault. A sure way to detect the use of lye upon rollers when new is by placing the thumbs of the hands lengthwise upon the surface of the roller, and pressing them apart, when the composition will readily split open, which cannot be done to new rollers fresh from the moulds. Rollers having received such doctoring might as well at once be renewed with new composition, if the pressman would save further vexation and annoyance."

The results of neglect may be stated—indeed will soon be apparent—as follows:—

1. A hard skin, with cracks.—Effects of lye.
2. Slight irregular cracks, but less hardness of skin.—Effects of benzine and turpentine.
3. Deadness of skin, with loss of suction.—Effects of oil.

Nearly all kinds of ink may be removed with lye, but heavy inks, both black and coloured, particularly when they have been allowed to harden on the roller, and when driers have been used, require benzine or turpentine.

In regard to the advantages of washing rollers after or before the work is done, much might be said on both sides. It is not always necessary, certainly, nor is it in many cases at all desirable in the interests of the rollers, to wash them after the work is done, and to put them away cleaned. Perhaps the safest rule is never to wash them except when absolutely necessary, and then only in the careful manner enjoined. Every time a roller is washed it is injured as much as it would be by half a day's work. When washed and put away clean, the surface is exposed to the air, the drying effect of which must deprive it of some of its moisture, and in proportion as this is lost the term of its usefulness is shortened. It is obvious that to

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preserve the natural moisture in the face, and its softness, elasticity, and suction with it, the face should be protected as much as possible from the air.

When strong inks have been used, or inks in which driers have been mixed, it is then, of course, necessary to clean up before putting the roller away, or the ink will cake and become hard. But when ordinary or light inks have been used, the rollers may be put away without danger unwashed for as long as a week or ten days, or even two weeks, in ordinary temperate weather. Although standing in oil deprives them of their suction, the same effect does not ensue necessarily from their being covered with ink, as the oil in the ink is so held by its co-ingredients that it cannot be absorbed in any great quantity; that is to say, in ordinary inks. If the "roller ink" without driers is used, of course even this risk is reduced to a minimum. If the roller can be safely left covered, as here suggested, we have no hesitation in saying that its good quality of face will be preserved fully one-fourth longer than it will be by putting it away clean.

If rollers are kept clean without too much washing, and when it is really necessary to work them, they are washed in a proper manner; and if, further, new rollers are made as soon as those in use show signs of failing, any pressman may be able at any time to be confident of turning out a good job as far as the rollers are concerned.

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CHAPTER VI.

VARIOUS MATERIALS USED IN THE PRESS-ROOM—Detergents: Pearlash, Potash, Turpentine, &c.—Lye Brushes and Troughs—How to Wash a Forme—Galley Presses, and How to Use them—General View of the Arrangement of the Press Room.

THE ink is removed from formes (that is to say, they are *washed*) with various solvents or detergents, and a plentiful supply of cold water. Whatever the chemical agent employed, the mixture goes by the name of *lye*, or *ley*.

The usual ingredient is *pearlash*, a pound weight of it being mixed in one gallon of water. It should be stirred up with a stick till the ash dissolves. The harder the water the greater the quantity of pearlash required.

Potash may be used, and a solution made in the same way.

Caustic Soda is very useful for this purpose. Dissolve 1 lb. of soda in 2 gallons of water, and add ¼ lb. of soft soap boiled; then stir well together.

Turpentine is also used in certain cases, as will be explained hereafter.

Lye is applied to the forme with a *lye brush*. These brushes are made of various sizes. Large ones are 11½ inches long by 3½ inches broad; middle sizes, 9½ by 3¼; small or galley brushes, 6½ by 2¼. The hair should be close, fine, and long, in order not to injure the type, yet to allow sufficient force to be used to search out every interstice in the letter where the ink can have penetrated.

Lye brushes are also made of a substitute for hair called fibre, which is coloured white, brown, or red. This material is very cheap, but cannot be recommended. The best bristles are the cheapest, and do not damage the type. In order to preserve a lye brush it should be rinsed after use, and allowed to drain.

Lye is kept in a jar or other convenient vessel. The best shape is that of an oblong box without a lid, as it is

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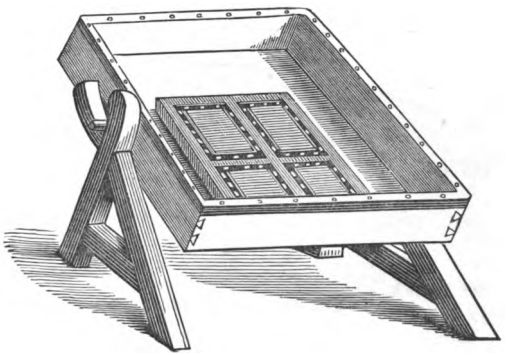
not so liable to be overturned. It should be made of iron, and have a strong swing handle.

A false bottom is very useful. It may be made of tin, and be hinged to one side like a lid; it will prevent the lye being spilled, or evaporating too quickly. If a few holes or perforations are made in it, a small quantity of lye can be communicated to the brush, while the trough is closed, which is a saving in various ways. Besides this, it may be used as a stand for the brush, and to keep it out of the lye.



The annexed is a representation of a *lye trough and stand*. The trough is made to swing, so that water may be washed over the forme, in order to rinse it after the lye has been applied. The trough ought to be lined with lead.

The following is the mode of using this trough, and of *washing a forme*. Place the forme in the trough, of course with the face of the type uppermost. Take hold of the rim of the chase, and, laying the forme down gently, pour the lye steadily over it. Then swing the trough a little, so that the lye may spread over the face of the letter. Having done so, take the lye brush and thoroughly brush the liquid over the letter, furniture, quoins, and chase. The residue should then be allowed to run out, and the forme completely drenched with water to rinse away the lye. The forme may then be lifted out and placed on its end, to drain away the liquid.

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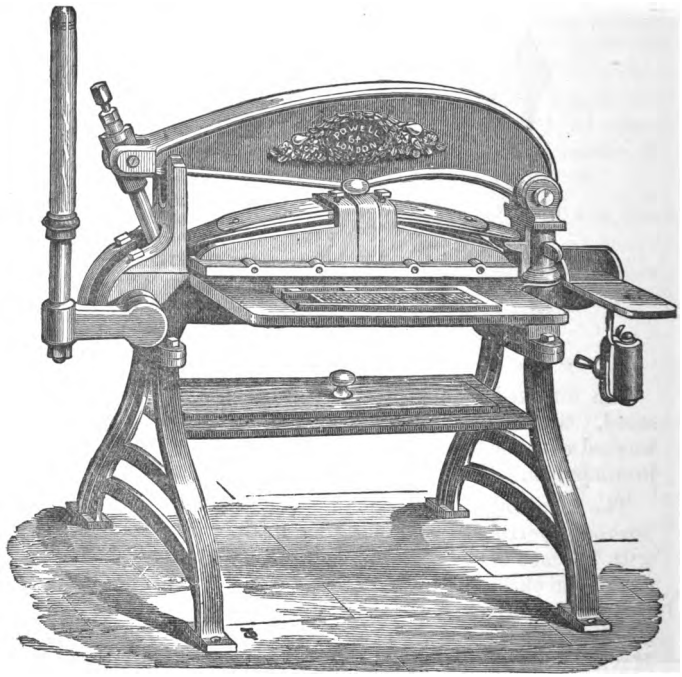
We have now described the chief appliances and materials of the press-room, and proceed to show how they are used. Before, however, introducing the tyro to actual press-work, we will, as a preliminary, show him how to pull a proof at a galley press, from which, indeed, the system applicable to all presses may roughly be learned.

The Galley Press.—This press is used, as its name implies, for pulling proofs of matter on galleys. Its parts are very simple and few. The iron beam at the top is



the lever that moves the platen. Underneath the latter a piece of blanketing is fixed to moderate the pressure on the type. When the handle is pulled downwards the platen descends, and the impression is effected. The

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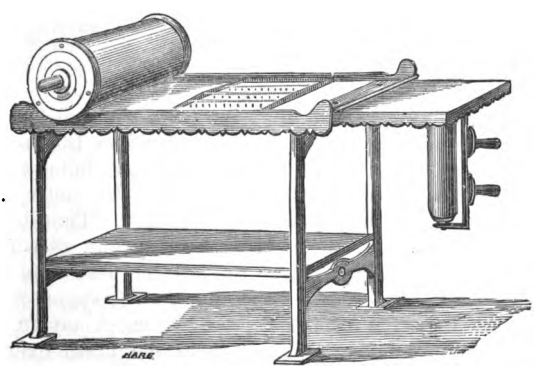
ink table, on which the ink is distributed, is at the right hand side, and underneath it is a hook on which the roller is hung. A shelf below the bed serves to hold the damp sheets of white paper on which the proofs are to be pulled. A movable piece of wood, forming a weight, presses the paper, and causes it to retain its moisture.

The galley of matter is placed on the table with the side which contains the quoins to the back.

A great deal of type is damaged by an improper use of this galley press. There should be a strip of wood fixed to regulate the galley, so as to bring it exactly under the centre of the platen. When the galley is not altogether filled with type, a bearer should always be placed at one end. The handle should not be pulled down violently, but just sufficient to obtain an impression.

Annexed is a view of a *roller galley press*, which is much simpler than the preceding, and is not so destructive to the type. It is also very cheap, and little time is occupied in taking a proof at it. The framework supports the



bed, on each side of which is a raised ledge. Over the latter runs a heavy cylinder, moved by a projecting handle, and covered with blanket. The galley is laid on the bed, inked, the sheet laid on, when the cylinder is rolled along

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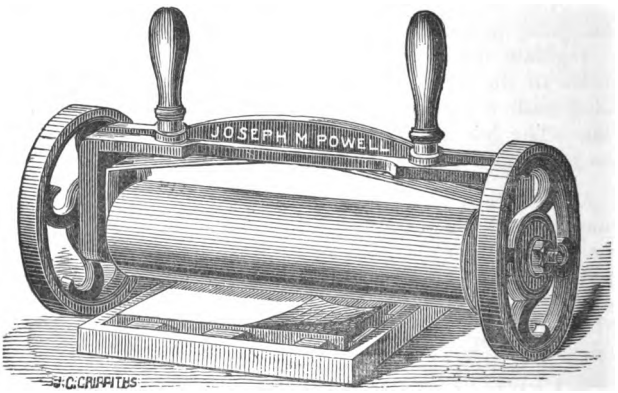
and a proof taken. The press was invented by Messrs. Chambers, of Edinburgh. It is used in almost all newspaper offices for obtaining proofs of news galleys.

Another kind of press for taking proofs is represented in the annexed diagram. It consists of a roller or cylinder covered with blanket, suspended by its axles in sliding boxes, and contained in a frame very similar to that of a press roller, but possessed of a wheel at each extremity.



The roller is so arranged that its lowest circumference is a little less than the height of type above the lowest circumference of the wheels, and it therefore follows that when the press is placed upon a table the roller is a little less than an inch above the surface. The sliding axle boxes are kept in their places by a spring, as will be seen in the engraving. When the printer desires to pull a proof of any matter, whether lying on the stone or in a galley, he inks his type and lays his sheet on in the ordinary way, and then simply rolls the press over it. The wheels will remain on the imposing surface or table, while the spring will regulate the roller so that it matters not whether the type is contained in a galley or not.

A novel and useful galley press has been invented by Mr. D. T. Powell. The galley of matter is laid on one

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table and passed through the press to the other. In the meantime the type has been inked by a roller suspended above. The paper on which the proof is pulled is in the form of a "web," or endless roll, standing at the top of the apparatus. The whole being automatic, the entire operation is performed in less than half a minute.

The Press Room is generally in the basement or the ground floor, or as near its level as possible. The object of this is to prevent the vibration which is caused by heavy machinery on an elevated floor. In very large offices the composing rooms are at the top, the press rooms next below, and the machine rooms below them again.

Wherever it be placed, it is most essential that the press room should have abundance of light; without this it is impossible to see the character of the work produced.

The presses should be arranged round the room in such manner, if practicable, that the light falls on the tympan when it is up. Room must be left at the left-hand side of each press for the two pressmen, for the bank and horse containing the paper in the course of being printed, and for the ink table. By judicious arrangement space may be economized, but it is essential that there should be no crowding. Round the room copies of old jobs are generally hung or posted up. In one corner may be stored the ink cans, in another there may be a pile of paper. Paste cans, lye jars, hammers, mallets, shooting-sticks, friskets, and a hundred other things of the kind may be lying about, but they should not be in disorder; each should be in its recognized place, although that may be the floor or the ledge of a table. It is impossible, in fact, to keep the press room in the same neat condition as the composing room, but if the different tools and materials are always kept in one situation, where they may be immediately found, the apparent disorder may be forgiven.

In the press room, too, there is a great deal of noise, which is not heard in the composing room. The rule enjoining silence at work is not necessarily enforced in the press room. The working of presses does not conduce to quietness.

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Pressmen are very different in their habits to compositors. They have not that quiet, studious appearance which results from sedentary labour and constant application to reading and deciphering copy. They are usually more robust, although the exercise of pulling the press bar is not as healthy an one as might be supposed. A large number of pressmen are ruptured, and there is much mortality among the class from heart-disease, caused by too protracted and too violent exertion of the upper part of the body.

Since machines were introduced, the technical abilities of mere pressmen have decidedly deteriorated. Case work and machine work have absorbed the most promising workmen, and there is even at present a scarcity of pressmen, leading occasionally to much inconvenience. Before long, probably, the balance will be restored, when we may expect a better class of persons brought into this branch of printing than at present practises it. Several of the best employers in London, and possessing the best offices, have apprenticed their sons to presswork, and their example will probably be followed by others, to the great improvement of the manners as well as the workmanship of the press room. The American "Encyclopædia of Printing" very truly says: "It is a notable feature in the history of printing in this country, that a large proportion of those who have successfully prosecuted the art have been celebrated for their superior knowledge of and attention to presswork. It is too much the habit of apprentices to devote their attention exclusively to composition, and as a consequence, compositors are always plentiful, and good pressmen comparatively scarce. All the money and labour spent in purchasing founts of letter, and in setting up type correctly or elegantly, are well-nigh useless when bad presswork mars the products of the type-foundry and the composing room. We have great faith in modern machinery, in improved presses and roller composition; but no machinery, and no chemical combination will cover up the blunders or carelessness of a poor pressman. An expert in this branch of the typographic art will produce good if not fine work on any press, and give a presentable

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appearance to fearfully battered type; while a botch will produce comparatively imperfect effects with splendid types, good rollers, and the best press that can be made."

The Rev. A. Rigg, already quoted, says on the subject: "In these days, dependent as we are, year by year, more and more, upon self-acting machinery, we are too apt to neglect a cultivation of skill in the artisan. In hand platen type presses the skill of the pressman is as essential to bring out the perfections of the press as is that of the copperplate printer. Beauty and finish of work depend upon the combination of a perfect press and a skilled operator. Rotating and self-acting machines are extinguishing handicraft skill. Our sewing machines will not improve the domestic capabilities of the wives in the next generation."

There is need, however, not only for maintaining the high excellence to which printing has already attained, in the hands of such men as Miller Ritchie, Bulmer, Bensley, and McCreery, but to endeavour even to surpass their best achievements. In no branch of the printing business is progress so feasible. Little improvement can be made in the manner of setting types, and their correct arrangement is estimated according to principles that are to a large extent unalterable. But in presswork endless combinations are possible, and there is the amplest scope for the exercise of skill, taste, ingenuity, and originality.

CHAPTER VII.

WETTING PAPER—The Trough—Why Paper is Wetted—Different Methods to be Adopted.

BEFORE describing the successive processes carried out in the press room, we may give some directions for the wetting-down of paper—the usual preliminary, in regard to most kinds of paper, to printing it.

Paper is wetted—*wetted down* is the usual phrase—in a *trough*, of which a diagram is annexed. The trough consists of two parts, one of them to contain the water and

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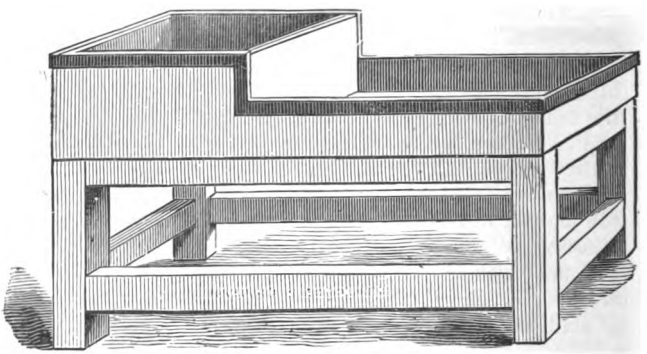
the other the paper. The former is raised considerably higher than the level of the latter. Both are lined with lead. The water tap is fixed over the trough, or cistern, which is to contain the water. Although the mode of using it may appear simple and, indeed, obvious, it really requires considerable practice and experience, and cannot be too carefully performed.

The reason that paper is wetted is, that printing on dry, sized, unrolled paper is supposed to injure the face of the type, and prevent a perfect impression being obtained. The stronger the paper the less pliability it has, and the more imperfectly does it receive the ink from the whole of the forme, especially if, as is generally the case, some of the



WETTING TROUGH.

types are not as high as others. An attempt is sometimes made to obviate this imperfection by using more ink. In time, this ink, not being taken up completely by the paper, accumulates within the face of the letter, and causes a blur, or smudge, over the forme, which is exceedingly unsightly; the ink, in fact, is pressed over the upper surface into the cavities of the type. Sometimes, too, an extra pressure is put on the type, which is not only very injurious to it, but destroys the appearance of the work, giving it an appearance at the back as if embossed.

On the other hand, the paper should not be too damp; if too much water is applied to it, it loses its strength,

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and can with difficulty be got from the type, as the ink sticks to it too much. If there is a very great superfluity of water in any part, or it is what is called "glazed," it will not receive the ink at all, as water is repelled by the oily nature of the ink. When the paper is too wet and rotten, pieces of it adhere to the forme, and then communicate themselves to the roller, making both dirty, and causing "picks," or small bits of dirt, which take ink and print themselves on the sheet along with the type.

The manner of wetting paper is as follows:—Lay a clean ream-wrapper on the wetting board, and on it a few dry sheets of the paper to be wetted. Then take a certain number of sheets (the proper quantity will be referred to presently), and draw them through the water. Lay these wet sheets on the top of the dry sheets. Turn up the bottom corner with the left thumb, and count the number of sheets that will make the first portion of the quire, and open it out straight. If, for instance, a quire is to be wet twice, it will be in two portions of twelve sheets each, there being twenty-four sheets in a quire; if wet three times, count eight sheets in a portion; if four, six sheets, and so on. This will make the heap regular throughout. The first portion of the quire being wet, proceed with the second and third, and so on with the rest. Turn over the last portion of every quire, after leaving the last wet sheet on the heap, so that its back will be opposite that which is on the heap. The object of this is to "break the back" of the paper. The back is the ridge caused by the fold, when sheets are folded into folio. In this way the paper will be got quite flat. Proceed in the same way to wet the remainder, and observe to turn down a token sheet every ten quires and a half.*

The whole of the paper being wet, lay the heap in a suitable place, cover it with another wrapper and a wetting board, and leave it about half an hour to soak. After that interval, press it with a heavy weight—say about fifty-six pounds—for an hour; then add as much weight as is at hand, for

* A token, as will afterwards be explained, is 250 sheets. The object of turning down the token sheet is to save future counting.

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the heavier the paper is weighted in this state the better. The heap, thus pressed for twelve hours, should be turned, and well mixed throughout, and again pressed for the same number of hours.

If paper is wanted in a hurry, it may be screwed down, between the wetting boards, in a standing press for a short time. This plan cannot, however, be recommended.

If the heap be too wet, putting dry sheets between every four, five, or six wet sheets, and pressing it in a standing press, will considerably improve it. If too dry, it may be sprinkled about every quire or so, and pressed, as above.

It should be understood that the more quickly the paper is drawn through the water, the less it will be damped, and *vice versâ;* while the circumstance of its being drained or not will materially affect its condition.

In regard to the amount of wetting to be done to paper, it may be said that it depends on two considerations—the nature of the forme, and the texture of the paper. If the forme is solid, and the paper hard and well sized, it will require more wetting than if spongy, and the forme open. For an open forme, too, the paper will require less water than for a solid one. The softer the paper is made with water, the thicker and heavier will be the impression when pulled.

Hard, well-sized paper may be wetted three, four, or six times in each quire, while soft, spongy paper should not be dipped more than twice or once in a quire. Perhaps it may be requisite only to sprinkle it every quire and a half or two quires.

Hence the wetting of the paper is a matter requiring care, attention, and judgment; and much of the beauty of the presswork will depend on whether it has been properly done.

When paper is very highly sized, it should not be pressed while very wet, or the sheets will adhere together. This inconvenience, however, may be prevented very often by putting a little sulphuric acid into the water.

Another method of wetting paper is thus described: Take a quire of paper by the centre of the back with the

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right hand, and the edge of it with the left, and closing the hands a little, that the quire may bend downward between them, dip the back of the quire into the left hand side of the trough, and, relinquishing the hold with the left hand, draw the quire briskly through the water with the right. As the quire comes out, quickly catch the edge of it again in the left hand and bring it to the heap, and by lifting the left hand, bear the under side of the quire off the paper previously laid down, till the quire is placed in an even position. To do this, lay the back of the quire even upon the open crease of the former, and then let the side of the quire on the left hand fall flat down upon the heap, and discharging the right hand bring it to the edge of the quire, and with the assistance of the left thumb, still in its first position, open or divide either a third or a half of the quire according to the thickness of the paper; then, spreading the fingers of the right hand as much as possible through the length of the quire, turn over the opened division of it upon the right hand side of the heap.

The wetting trough should be at least two inches longer and wider than the paper, when folded, that is to be wet in it, and it should be at least six inches deep. There should be a cover, with hinges, on the left hand compartment, which cover should fall over on that side, and, resting horizontally, would form a shelf upon which to lay the paper previous to wetting it.

Cards are wet by being held in both hands in the trough and shuffled under water from the left hand into the right. They ought then to be straightened and pressed. Cards which are too spongy to bear this may be held tightly at one end, while the other end is put in the water and opened quickly by drawing the fingers over the end. The wet end should then be held tightly while the dry one is being treated in a similar manner. The cards may afterwards be pressed, but with only a moderate weight.

There is another method of preparing paper for being printed on; by "rolling" or calendering it. The compression of the textile fibre, caused by being subjected to great pressure, not only gives the paper a fine glossy appearance, but adapts it to receive the impression from the types.

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Much of the fine bookwork now produced is done on paper that has been merely "rolled," and printed dry, and is not even pressed subsequently. Reference to this subject will appear in the chapter devoted to "hard packing."

After the paper is thus prepared, it is ready for printing. It is taken in a heap and placed on the *horse*.

CHAPTER VIII.

PRELIMINARY OPERATIONS OF PRESS WORK—Dropping the Forme—Centring the Forme—Fastening down—Marking round—Putting in the Blanket—The Tympan Sheet—Pulling a Proof.

IN describing the operations appertaining to Press work, we shall adopt the style of instruction followed in regard to Composition. We assume that the reader knows nothing whatever of the subject, and propose to explain minutely each successive step of the process from the very beginning.

In printing at the hand press, two persons generally work together. One of them "pulls," or works the press; the other "rolls," or inks the type. We shall suppose, for the sake of clearness, that both operations are done by the same person. In the ordinary course of business, this would be called "working half-press."

Let us imagine that the operator is standing at the side of an Albion press, near the handle of the rounce. On the off side will be placed the inking table, with a roller on it; on the workman's right hand, the bank and horse. We will also suppose that the job on which he is about to work is a quarto circular.

The press for such a job might be as small as a foolscap folio, or as large as a double demy. In the latter case, certain expedients would be necessary that would at this stage only confuse the tyro; so we suppose that the circular is to be worked on the small press.

Dropping the Forme. Run out the table to its fullest extent, by turning the rounce-handle. Raise the tympan

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to its proper inclination. See if the table of the press is perfectly clear of particles of dirt, and is quite dry. If there is any dirt on it, the types lying over such places will be raised higher than their fellows, and the impression will be uneven. If there is any water on the table, it will rise up between the types in the course of working, get to the face by means of the roller, and prevent the ink in such parts adhering to the types; the printing, therefore, will be black in some places and without colour in others.

Take up the forme by the chase. Then lay it down endways on the press, the head-line lying nearest the platen. Examine the back of the forme to ensure that there is no dirt or pieces of metal adhering to it; also that it is quite dry. If it be wet, do not lay it on the press till you have dried it. This may be done at a fireplace, or by setting fire to some paper placed under the forme. The latter is done in some offices, and is a very dangerous and reprehensible practice. In either case, keep "to windward" of the forme, as inhaling the fumes of type is said to be deleterious.

The forme being all right, "drop" it smartly on the press, that is, let go the part of the chase between the fingers. Now, with your apron, dust off the face of the forme to clear it of any dirt that may have become attached to it. The head of the forme ought to be away from you; if it is not, lift it and turn round. The pressman always has the matter before him right side up, as in ordinary reading; the compositor, in setting and correcting, as we have already shown, has the type reversed.

If, however, the forme is a heading, or some kind of job that could not be printed in this way, the forme may be placed crosswise on the platen, with the head nearest the end of the carriage, and the foot towards the platen.

The next thing is to "*centre the forme*," that is, to get the forme in the middle of the table. The type matter must be in the centre, whether the chase be so or not.

The reason of this is that the platen always "gives" more or less when the type underneath is out of the centre. The piston is placed, of course, in the middle of the platen,

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and there are strong stays extending from the part where it comes in contact with the platen, in several directions, but these do not give absolute rigidity. Hence it is very dangerous, and may even break the platen altogether, to work a forme out of the centre without some special precaution. This consists in the use of bearers, which are pieces of wood or metal (old letters will do) type high, placed as far from the centre on one side, or the full extent of the type forme on the other. Practically, they extend the area of the forme until the whole is really in the centre of the table and the platen. Always beware of unequal strain on the platen; it will inevitably injure, if it does not break, the press.

If bearers are used, means must be taken for preventing them printing, or even giving a blank impression, on the sheet.

"Centring" is done by getting the forme (not the chase) at an equal distance from the two ends of the table, that is, the end where the tympan hinges are, and the end nearest the platen. Having done this, and ensured the situation by measuring, with anything (a reglet or the end of the apron) that may be at hand, ascertain whether the type is in the centre crosswise of the table. Notice that on the front edge of the platen there is a nick cut; this is for getting the forms in the middle. Run in the carriage by turning with the left hand the handle of the rounce, until the type matter is well under the mark. Shift the chase if the mark be not over the centre. Then again turn the handle and run out the table to its full extent.

Fastening the Forme. Having got the forme in its proper position, it must be secured there, otherwise the motion of the carriage in running to and fro would cause it to shift, and destroy the results of several subsequent operations.

This may be done in various ways. The most simple is by the use of the "rack" chases already described in the first part of this work. These are fitted to the platen, and on the inside of them are notches into which cross bars may be dropped.

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Another plan of securing the forme is to place small chases on either side of it, and tightening them with quoins and a piece of side stick. This is only practicable, of course, when the forme is very much smaller than the bed of the press.

A third plan, applicable when the forme is small, is to lift it and paste its back all over. Then put a sheet of paper to it, rub it with the hand till it adheres, then paste the back of that again. If the forme is again dropped, the intervening paper and paste will make it stick to the table. This is a clumsy and imperfect expedient, but is sometimes resorted to when a job is wanted in a hurry.

Another plan is to put a few pieces of wooden or metal furniture between the end of the forme and the tympan hinges—exactly filling up the space, and some furniture with a side stick at the other end. Quoin up tightly, and the forme cannot move. Select a proper quoin, and do not "vamp up" the job by putting in leads. This careless and destructive practice, so often resorted to, is the cause of much loss in the course of a year in any office where it is permitted. The leads used are sure to be broken and rendered useless.

Next "*mark round the forme.*" This is to know its exact position if it has to be lifted or should happen to get shifted. Run a piece of slate pencil, or the end of a lead, closely round the chase; this will leave a mark sufficient to enable you to restore the forme to its exact place hereafter.

Putting in the Blankets. Turn down the tympan on the forme, undo the tympan hooks, and ascertain whether the blankets are right. Some remarks have already been made on this subject, but the young pressman will learn more by experience as to the best kind of blanket to be used for any particular job than could be given by precept here. If the blanket is inside, is straight, even, and free from creases, put the inner tympan on again, fasten it with the hooks, and raise the two to the proper position.

The Tympan Sheet. This is a sheet of paper fastened upon the tympan as a guide to the pressman in laying

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the sheets when working off the job. It must be in the exact position that the sheets are to occupy to get a proper impression.

Take a sheet of "its own;" that is, a sheet of the paper belonging to the job; lay it on the forme. Be sure to put it on quite even and straight, with the exact margin on all sides that you would wish to see in the job. Damp the tympan a little with clean water and a sponge; turn the tympan down on the forme with the right hand, run in the carriage by turning the handle of the rounce with the left hand, until the platen is over the middle of the tympan, and pull the bar with the right hand. Do this carefully; beware of too heavy an impression at first. It is better to be too light, and then by degrees to ascertain the proper pressure to be employed.

It is advisable to "pull the bar home;" that is, as far back as it will go, until the knuckle of the arm comes in contact with the cheek of the press. If in doing so the pressure is felt to be strong, desist for a moment, turn the little screw at the back of the cheek until it projects more or less, and prevents the arm coming completely back to the cheek. The object of this is to arrest the increasing power of the lever in its approach to the cheek. Turn it until a little pressure has brought the arm back as far as it will go. If it is afterwards found that the impression is too light, turn the screw the reverse way, and it will recede and allow the arm to be drawn further back. The further back the arm is drawn, the greater the impression on the type.

As work at a Columbian press is just the same as at an Albion press, except in the regulation of the power, we may here refer to the mode of altering the impression on one of those presses. The arm of the Columbian press is quite different to that of the Albion, as will be seen at a glance, there being an extra lever. The latter is in two parts, joined together by a screw. It is fastened to the larger lever by a pin working in a socket, which is easily removable. Take out the pin and hold the screw-lever in the right hand. Then turn it round, and it will lengthen or become shorter according to the direction in which the

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screw is turned. The shorter you make this arm the more powerful the leverage, and, of course, the impression; the longer it is, the lighter will be the pull. Replace the pin, and the press will be ready to be worked again.

Be careful in pulling not to let the arm suddenly fly back, by which the press might be broken. There is a powerful counterpoise in the head of the press, causing the arm to go back by itself without being thrust by the pressman. Hence, if he suddenly lets go his hold, the arm is acted on by this power and flies back. He should rather restrain its movement, and keep it in his hand until it is fairly back in its place.

There is another caution to be given in respect to pulling. Do not pull the arm until the carriage is quite still; if arrested suddenly, by the action of the platen coming down, a "slur" will be caused. This is an indistinct impression, resulting from the types moving laterally when in contact with the paper.

Do not run the carriage in too far; this will be known by a sudden "bump" occurring, through the carriage coming to a full stop against the end or the "stop" of the ribs. On the other hand, do not bring it out too far, or another "bump" at the opposite end of the rails will indicate it. The danger of doing this is, that the girth is liable to give way, and a new one may be necessary.

If the press be in good condition, a very slight movement of the left hand on the handle will cause the carriage to run in as far as may be required.

To recapitulate; pulling consists of

1. Running in the carriage by turning the handle of the rounce, with *the left hand*, from you.
2. Pulling home the bar with *the right hand*.
3. Running out the carriage by turning the handle of the rounce with *the left hand* towards you.

This may appear unnecessarily minute to practical printers, but we have seen beginners who for some time, in the absence of instructions, tried both to turn the handle and pull the bar with the right hand.

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If the tympan has been sufficiently damped, and there has been sufficient pressure on the type, the sheet of paper, on raising the tympan with the right hand, will be found to have adhered to it. If it has not, go through the process again, damping more and pulling a little harder.

Now paste the corners of the tympan sheet to secure it. Take care that the paste does not come over any part of the type, or it will cause a heavier impression there than over the other parts.

Put in pins at the edges of the sheet as a guide in laying subsequent sheets. Two on the longer side and one on the shorter will be sufficient. Avoid having too many pins; unnecessary ones only tend to make the sheet crooked.

There is a little art in putting in pins. They should project half an inch or so over the sheet to be printed; but they should go completely through the tympan, underneath it, and come out again by their other end. The head must be in the direction of the type. They must be quite firm, so that when the sheet is well pressed home to the part almost in the middle, where the projection begins, they will not shift. The head should be raised a little, so as to allow the sheet to go in comfortably; for this purpose the pin must be bent somewhat. Above all, they must not ride over any part of the type, or they will batter it when the platen comes down. If the margin is very small, they must be got in some open space, such as over quads or leads, &c. Care in setting the pins neatly and accurately will be well repaid subsequently.

Pulling a Proof. Take another sheet of paper and put it in the pins. Then "roll the forme;" *i.e.*, ink the type. This brings us to the mode of inking.

Take the can of ink and remove the lid. Then with a palette knife, spread a little on the top of the ink table. Let it be in a long even streak, the full width of the table. Beware of taking too much; for present purposes try how little will be sufficient. Spread it out as thin as possible, avoiding clots. Take the roller in the right hand, and just touch the ink with it. It will take up a narrow streak of ink; the next thing to be accomplished is to get this nicely

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distributed all over the roller. Lay the roller down lightly on the table and draw it towards you. When you have got to the end of the table it will be found that the cylindrical shape has left a series of parallel streaks; while between them there is no ink whatever. Repeat, and some of the intervening spaces will have become filled up, provided the roller was not put down on exactly the same place. Do this over and over again, and each time the coating on the table, as well as that on the roller, will be more complete and thinner. Go on, doing it quicker each time, till the whole is beautifully coated with a thin film of ink. This is called *distributing the ink.*

This is a very important part of press work, and pains should be taken to do it properly. Two cautions are necessary.

Avoid having too much ink; it is easier to increase the quantity than to decrease it. The mode of increasing is, of course, to take a fresh supply. To decrease it, which is rendered necessary by the roller being "too black," there are two methods in vogue. One is to scrape the roller with a sharp knife and so to remove superfluous ink. Be very careful in doing so that you do not cut the roller. The other is to lay a piece of strong clean paper on the ink table and distribute the ink on that, till it is nearly all off. The paper must be held with the left hand at the upper end, or it will go round the roller and adhere to it. If strong paper be not used it will tear, and if there be any dirt on it, it will get mixed with the ink. This is called "sheeting the roller." The golden rule is to have too little ink rather than have too much, and to go on taking a little more until the proper quantity is attained.

Secondly, be very careful not to "run into the ink," or the roller will be "smothered," as it is expressively said. If not perceived, and the roller is applied to the type, there will be great blotches of ink in different places, perhaps filling it up and causing "monks," or black patches, in the impression. The forme may then have to be lifted, washed, dried, and again adjusted on the press.

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Having got the ink table and the roller nicely and evenly coated with the ink, you may roll the forme. Do this lightly, yet with sufficient pressure to cause the type to absorb some of the ink. Very likely the forme will not "take" the ink at first, but instead of getting more ink, briskly and repeatedly roll it over, even "dabbing" it in parts which repel the ink. Avoid inking the chase, furniture, or the press table; the roller should only touch the surface to be printed from. You may roll first in one direction and then in another.

Be careful that the suction of the roller does not draw out any of the types. If these lie on the surface unobserved, and the press is pulled, they will cause a "batter."

Replace the roller on the inking table. Turn down the tympan as before, run in the carriage, pull the bar, run out the carriage, lift the tympan, and you will find you have pulled your first "proof."

CHAPTER IX.

JOB WORK AT PRESS, continued—Ordinary Imperfections and their Remedies—Making Ready—Use of the Frisket—Miscellaneous Hints and Cautions.

THIS first proof must be very carefully examined, and its imperfections will afford a useful study to the young printer. We will refer to the most probable blemishes *seriatim*, and append the mode of remedying them.

The proof may be crooked.—This shows that (*a*) the sheet was not properly laid to the pins; or (*b*) that the pins were too loose, and allowed the sheet to move when the tympan went down; or (*c*) that the pins were not properly placed. The manner of correcting these faults is obvious.

The proof may be too pale.—Take more ink on the roller, as already directed. Be careful too much is not taken.

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The proof may be too black.—Take some ink off the roller by "sheeting" it, as already described; or if there be a corner of the ink table that has not received ink, distribute there, and the colour on the roller will be reduced.

The proof may have light patches in some parts.—These are called "friars;" they are caused either by imperfect distribution of the ink on the table, or by insufficient rolling of the forme.

The proof may have black patches in some parts.—These are "monks," caused also by improper distributing and rolling, but result from having too much ink. Distributing the roller well on the ink table may cure this evil.

Some of the letters may not print at all, only leave a blank impression.—They have missed rolling, most probably because the forme is damp. Observe whether the dampness proceeds from the forme or the table.

Some of the letters may be "filled up," and print altogether black.—These are "picks;" they are caused by dirt on the forme or on the roller; in either case, perhaps, proceeding from dirt on the table. Get a pin, and carefully, without injuring the face of the type, pick out the bits of dirt, or rub the part with the brush made for this purpose called a "pick brush." If this is not effectual, the only remedy is to lift the forme and wash it over.

The letters may print double.—This is caused by a "slur." It may be that the platen has been pulled down before the carriage stopped. But the defect may indicate a more serious evil. The platen may not be rigid; being hung too loosely. Ascertain if you can shake it or move it from side to side. It ought to be entirely free from lateral motion. Get a screw-key and try if the different screws connecting the platen with the piston are all equally tight. Do not screw one up more than another, or you will spoil the impression, but have everything tight and fast. The tympan may be loose. If so, tighten up the two screws which form the hinges and connect it with the carriage. This part of the press, too, should be entirely free from lateral movement.

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The bottom lines may be "smudged."—The platen has been brought down too soon, and rubbed over the lines as they have been moving on the press.

There may be creases in the paper, and open ridges which have not been printed.—The paper has been badly laid, and been too baggy. Lay the next sheet flat and square, and this will not occur again.

One half, perhaps, only of each letter prints; the type looks as if it had got on one side.—It has got off its feet, and if you examine it, instead of the top of the letters forming a straight line, they look as though they were the teeth of a saw. The only remedy is to unlock the forme and try to set them on their feet again, but this is exceedingly troublesome. Fortunately, it is simply the result of carelessness in locking up, and thus can easily be prevented.

Now turn the paper on its back, and examine it in a good light; observing carefully the defects of impression.

The "pull" may be very heavy, the letters seeming disposed to run through the paper.—Take off some of the impression, by turning the impression screw or adjusting the wedge on the chill.

The impression may be heavy in parts.—This may arise from a variety of causes. There may be dirt or paper underneath the forme; if so, lift it. There may be dirt on the tympan, and you will have to take off the tympan sheet. A very heavy ridge of unnecessary pressure shows that the blanket has got crumpled. Open the tympan and smooth it out.

The bottom of the forme may have got too much impression and the top little or none, and *vice versa*.—This may arise from two causes. The platen may not have been properly hung, and is not parallel to the table. Get a spirit level and try it; any "hanging" at either side may be obviated by turning the screws of the piston. Or the carriage may have been run in too far, or not far enough. This defect often occurs on old presses. It can easily be discovered and by care easily remedied. For this and many other reasons, we advise the beginner to practice on a press in good working order, and with proper tympan and

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blankets. If the two latter have holes in them, or are nearly worn out, they cause a variety of defects which can be remedied only after experience.

Some of the lines may be heavily printed, and others only lightly.—The cause of this may be two-fold. All types are not the same height to paper, and types even of the same height, when new, get lower by use; the rubbing on the imposing stone reducing their altitude. The longer any kind of type is used the more worn, of course, it becomes, and this wear naturally reduces the height. This is the most common evil with which the pressman has to contend, and is the most difficult to obviate. It opens up a new subject altogether—*Overlaying and Underlaying.*

Leaving the point for the moment, we may remark that now is the time to have the proof passed, and if there are any corrections to be made in the forme they should be done now. We will suppose that the correction, appertaining as it does to compositors' work, has been done, and the forme carefully locked up again. See that it has not shifted, but corresponds with the lines marked round it. Be sure that there are no odd letters left on the chase or in the furniture. The roller will certainly pick these up, probably deposit them on the forme, and then a batter will be caused.

Having got everything right again, pull another proof and begin to "make ready"—that is, get the impression equal and level over the whole of the forme.

Now it is obvious that if we have lines of different heights, and it is necessary that all of them should receive the same amount of impression, there are two ways of working. The low lines must be raised by putting something under them, or they must have something put over them. This is called underlaying and overlaying.

In underlaying we put a piece of paper, or even, perhaps, thin cardboard, *under* the type; in overlaying we put the same upon the tympan sheet. Either will correct the inequality.

Whenever practicable, underlaying is to be preferred to overlaying. Because, even if by overlaying we get an

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equal impression, we do not get as good inking. The line that is low more or less escapes the roller, and loses its proper supply of ink. But underlaying is both troublesome and dangerous. It involves lifting the forme each time it is done; and, in lifting, letters may drop out, and accidents be caused.

Overlaying is by far the readiest plan. It is done in this way. Pull a sheet without inking the type. Then cut out the lines that are light, and paste them carefully on the exact places on the tympan sheet where they fall. One piece of paper may not be sufficient, and others may have to be pasted on. Proceed very carefully; do not put too much on at first, but gradually build up your overlays; from time to time pulling an impression on a sheet of common paper to judge of the effect. Practice and experience will gradually enable the young pressman to do this more expeditiously; at first he must have patience, and get the forme into working order by slow degrees.

Be careful to cut the overlays of the exact size required. If they extend beyond the part required they will entirely neutralise the effect. Paste them carefully all over; a thick layer of paste in one part and a thin one in another must give only bad work. These cautions are applicable also to underlays. A good hard paper is the best for the purpose; soft spongy paper soon gets flattened out, and the work has to be done over again.

Old type and a bad tympan tax the resources and often exhaust the patience of the best pressmen. They, however, soon acquire a very quick method of patching a tympan sheet. They put a little paste on the back of the left hand and in it hold a piece of paper. They then go over the proof from one end to the other, tearing off as much as may be required for each place, pasting it by one finger, and sticking it on with another—all being done with remarkable rapidity. This, however, the tyro must not attempt.*

* Fine woodcuts are overlaid in quite a different manner, to which we will devote a separate chapter. Meanwhile, it may be remarked, that if a block occurs in a job to which the novice is put, his best plan will be to unlock the forme, take it out, and underlay it till it is very slightly higher than the surrounding type. For common work this will generally be sufficient.

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When the overlaying has been done to the satisfaction of the pressman, he should paste a piece of thin tissue paper over the whole, to prevent the overlays getting moved, and to make it more comfortable to lay on the sheets.

Now pull another sheet; see whether it is satisfactory in all respects. A good impression should be sharp and clear throughout; free from monks, friars, or picks. The pull should be light, only just sufficient to "bring up" the types.

If it be found that the types will not come up without a heavier pull than is desirable, open the tympan and put some sheets of paper in besides the blanket. Some pressmen do not use a blanket at all; employing instead a few sheets of tissue paper, and perhaps a piece of cardboard. There is no rule on the subject; all must be the result of experiment. Before commencing to print the pile of white paper, the job should be got perfectly ready; and a copy passed by the overseer.

So far we have been considering the system applicable to a quarto circular. If, however, this had to be printed on a large sheet, say half a sheet of foolscap, there would be large margins; and these margins would "dip," that is, fall on the furniture, at least on two sides where there were no pins to keep them up. They would, consequently, get "blacked," as, however careful the rolling may be, some ink will get on to the furniture. We have now to show how, in press work, this is avoided.

Reference has already been made to the *Frisket*, the thin iron frame slightly smaller than the tympan, which is hinged to it, and secured at one side by a nut and screw.

This frame is intended to be covered with paper, and when folded down it forms a sort of mask for the sheet; that is to say, it intervenes between the sheet and the forme, those parts that are over the latter being cut out; the blank parts of the sheet are, therefore, completely protected from being soiled. Cords may be used instead of paper; they should be stretched transversely from side to side, so as to give the necessary support to the blank portion of the paper to be printed, and yet to prevent it encountering the face of the type.

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The frisket is, as has been stated, hinged by pins to one end of the tympan. The other end is supported by what is called a "frisket stay," a piece of wood projecting from the wall or depending from the ceiling. The frisket should not, for convenience sake, have as much inclination as the tympan.

An experienced pressman manages to bring down the frisket and the tympan by one continuous motion. He does not first fold down the frisket on the tympan, and then fold the two together over the forme, but by a circular motion gets the frisket down in such a position that while holding it by the ear he can just catch the frame of the tympan, and then he holds the two together. This is called "flying the frisket," but it is difficult to describe without a diagram.

The young pressman has now learned the rudiments of his art, and must apply himself to gaining proficiency in the different operations described, preparatory to entering upon the developments of which they are capable when applied to other classes of work. A few hints and cautions may close the chapter.

If you work with a frisket—but avoid the necessity for one whenever possible—beware of its falling suddenly and battering the type.

Keep your press in good order. The parts intended to be bright should be kept bright. An occasional rub with a greasy rag will keep both polished iron and brass bright, and without any great labour or waste of time. In some offices the dull parts are painted occasionally with Brunswick black, which gives the presses a smart appearance; we have even seen them polished with blacklead, which we cannot recommend. Never allow any brickdust about a press; some of it is sure to get into the working parts and do damage.

Always keep your press well oiled. This not only tends to the minimising of wear and tear to the press itself, but saves a vast amount of labour to the workman. See that the ribs are well supplied, but do not have them running over with the oil. Then put some in at the head, to

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lubricate the chill and the working parts in the head. When properly adjusted and oiled, the arm ought to fly back, if pulled home and suddenly released. Instantly stop any "creaking;" find out the place whence the noise proceeds, and apply some oil.

Too much oil, especially if bad, as most cheap oils are, is nearly as mischievous as too little. A press that is clogged up with oil and impurities, is both unpleasant and laborious to work. Paraffin oil is a good solvent of most of the ordinary lubricating oils; a little run into the ribs will often quickly clear them of a variety of old-standing filthiness.

In badly-managed offices the tills of the platen—that is, the spaces between the strengthening ridges—are generally filled with pie, broken leads, quoins, and dirt, the whole saturated with oil. This is simply disgusting; these places were never intended as receptacles for such stuff. It ought to be a rule to keep the tills perfectly clear of everything, except it may be a bearer or two, or a bodkin, or something directly appertaining to the press.

The platen of a press should be occasionally scraped with an old piece of rule, as dirt is apt to accumulate underneath, from the tympan. If this be allowed to remain it acts something like an overlay, and effectually prevents a good even impression being obtained.

Although it is the duty of the man who rolls to keep the heap of paper straight, it should be the aim of the pressman to lay the sheets as evenly as possible as he takes them off the tympan.

It is much better to get the overlaying done once for all before actually beginning the job, than to commence with that work only half done, and then to stop every dozen sheets or so, to potter with obvious imperfections. On the other hand, however confident you may be as to the efficiency of your work, keep watching the sheets as you take them off.

All the time when he is not engaged inking the forme, or straightening the heap of paper, the roller should be distributing. This is one of the secrets of good presswork.

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It is the duty of the pressman who is rolling to look after the due inking of the forme and to watch the colour—*i.e.*, to see that just the proper quantity of ink is applied each time. However, if the man at the forme observes that more or less ink is required he should immediately tell the other. Pressmen call themselves "partners," and this term indicates the mutual faith that should be kept between them.

In most work it is well at the outset to select one sheet, and to keep that out as a standard by which to regulate the colour of the whole. The eye is very apt gradually to get accustomed to a pale colour, and when a late sheet is put beside an early one for comparison the difference is often very striking.

Nearly every office now possesses a cutting machine, but paper is sometimes given out to be worked that has one or two edges cut by hand with a knife. Whenever possible, lay the sheet to the edge trimmed by the machine.

To ascertain whether a piece of paper is cut straight—that is, to the shape of a perfect rectangle—double it up diagonally, and if the sides coincide it is correct, but if not the inaccuracy will be immediately apparent.

If the sheet is crooked, work to the top and left-hand side. The other sides may be trimmed afterwards.

When working the second side of a job, great care should be taken that it does not "set off." The pressure of the types causes some of the printing ink at the back to communicate itself to the tympan sheet. This gradually gets foul, and then begins to blacken each sheet as it is applied to it; so much so, that in some cases, without the utmost vigilance, the job will be spoiled. As soon as there is any symptom of this, put a piece of tissue paper completely over the tympan sheet, and renew this whenever necessary. In this way only can "set off" be prevented.

In the next chapter we intend to carry the subject of press work a little farther, and show how sheets of books are printed. Several of the directions therein given are applicable to the best class of jobbing, and the workman engaged only on the latter class of work will occasionally find it to his advantage to understand and act on them.

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CHAPTER X.

BOOKWORK AT PRESS—Preparation of the Forme—Putting in the Blankets—Laying the Tympan Sheet—Arranging the Points —Making Register for the Reiteration—Other Operations in Making Ready—Rolling—Pulling—Manipulation of the Sheets —Turning the Heap—Various Hints and Cautions.

IN the present chapter we need not recapitulate the general instructions already given concerning the press and the roller, and the method of working them. To some extent the system adopted in job work is applicable to bookwork, but the greater importance of the latter, the complications arising from the formes being made up into pages, and the necessity for absolutely correct "register," give rise to certain points which require elucidation in detail.

The handling of the forme of matter will be the same as already described, but much greater care is necessary to see that the back of the forme is clean, and that no particles of dirt adhere to it. These will be as troublesome in the after working as any left on the table. Above all, be sure that no bits of broken type, spaces, leads, &c., have stuck to it on the imposing stone; these are sure to require, if discovered afterwards, the "lifting" of the forme. Also notice whether spaces, thin types, or other bits of metal have got between leads and type in spaced-out matter. This often occurs in correction, and is very dangerous, not unfrequently resulting in the forme being broken when "dropped" on the table.

If letters drop through when the forme is inclined, it denotes bad justifying of the matter, or imperfect locking up. If the forme is very loose, place a board behind it and remove it to the composing-room. Lay the two down and lock up again. When tight enough, lift the forme on to the imposing stone, unloose the quoins a little, plane down, and lock up thoroughly. Then return the forme to the press-room. Letters under a forme usually cause the types standing over them to be battered when the first

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impression is pulled, and cause immense trouble in correction, besides wasting time just when it is most valuable—when the job is going to press. The fault arises entirely from carelessness on the part of the compositors.

Sometimes, to get down on the press a forme that is badly justified and loose in different parts, a piece of paper is pasted over the back, which prevents the letters falling out. We need hardly say that this is a very unworkmanlike expedient.

After centring and fastening down the forme, put in the blankets. It is usual for pressmen, after they have finished off a job, to take out the blankets, hence it may be necessary for the tyro to place them in the tympan. Before doing so, however, rub them together, and work them in the hands so as to soften them and equalise the nap all over. If a long number of a job have been worked off, the portion of the blanket immediately over the forme will be found to have become quite hard and thin, often glazed. If returned to the tympan in this state, the part of the new forme underneath the indentation would be worked lighter than the rest. Observe, further, whether there are any holes in the blanket, either through ordinary wear and tear, or the carelessness of previous pressmen, who may have permitted rules to stand up and cut the tympan and blankets, &c.

Next put on the inner tympan and fasten it and the outer one with the hooks and buttons provided for the purpose. Now get the tympan sheet neatly fixed, without creases of any kind. The system of doing this is to some extent the same as that adopted in job-work. The forme being in several pages, the procedure is rather more complicated. We will suppose it is a quarto forme; the first thing to be done is to fold a sheet of the paper in quarto. Lay the long crease upon the middle of the long cross of the chase, and the short crease over the middle of the grooves of the short cross. Then wet the tympan, turn it down, and pull as already mentioned.

Turn up the tympan again and see whether the sheet be laid even; if it has not been laid even on the forme, it is better to relay it and pull it again. It is of great importance

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that this tympan sheet should be laid on even and square; then paste the corners as already directed.

This sheet is called the tympan sheet, and is placed there as a guide to lay all the other sheets upon while the work continues.

We have already explained the use of points, which supersede the pins that are sufficient in job-work. A few hints on this important matter may be necessary.

As a general rule it is best to keep the points a due distance from the edge of the paper; for if this is not done in working the next side (the "reiteration"), the pressman will be compelled to carry his furthermost point hole inconveniently far from him, which will cause a loss of time if the number to be worked is a long one.

It should further be observed that the less distance there is between the off and near point-hole the better, as it saves time; for the workman must draw his body so much the further back to place that hole on its point. He therefore places the near point further into the paper than the off point if it be folio, quarto, or octavo; but for twelves, equally distant from both edges of the paper. By placing the points according to the above directions it also prevents the workman from turning the heap wrong on the reiteration.

Having made choice of properly spurred points, place them securely under the point screws, and parallel to each other. This done, lay the tympan down upon the forme, holding the frisket end of it in the left hand, about an inch and a half above the face of the letter, and sink the body downwards till you can see between the forme and the tympan. With the ball of the middle finger of the right hand press gently upon the tympan over the point ends of each point successively, to see if they fall in or near the middle of the grooves of the short cross. If they do, the forme lies in the centre of both the ends; if they do not fall exactly in the middle, move the forme between the ends of the table till they do, and then quoin up both ends of the chase. The latter will, however, generally be unnecessary if due care is taken in placing the crease of the tympan sheet in the centre of the short cross.

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Before proceeding with rolling and pulling, it may here be convenient to describe the manner of laying down and making register for the second sheet, called the reiteration.

The three most important matters to be attended to are:—

1. Obtaining an even impression.
2. Equalising the colour to that of the first side.
3. Securing accurate register.

The difficulty of making register will be much decreased if the compositors have been careful in obtaining a proper pair of chases, and in correctly dressing them with furniture.

In the reiteration, the quoins on the off side and the right hand end of the table are seldom moved, but lie as gauges for every succeeding forme; for thrusting the chase close against these quoins the register is almost if not quite made.

To prove the register, remove the frisket and points, and pull a sheet of the work. On raising the tympan, the sheet, released by the absence of the frisket, will be left on the forme with the printed side upwards. Any deficiency in the register may now be detected by the eye.

Should the register be out at the sides, it must be remedied by moving the points; if out at the heads, the moving the quoins on the off or near sides of the table will effect the requisite alteration. In the event of these operations failing to produce register, the scaleboard dressing of the chase may be added to or diminished. Should, however, the inaccuracy arise from imperfect making up of pages or furniture, the integral parts of the forme must on no account be meddled with, as in the event of letters slipping, leads rising, &c., the compositor will be held responsible.

The workman in producing good register should avoid having ragged point-holes on the white paper. Where spring points are not at hand the evil may be avoided by placing paper bolsters in a parallel line with the ends of the points.

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Making ready the forme includes also the following:—

White Pages.—If these happen in a forme and a new frisket is used, the part of the latter immediately over them should not be cut out. If an old frisket is used, and that portion is already cut out, a piece of paper should be pasted over it to cover the white page in the forme, that it may not be blacked.

Those pages which are nearest a white page always come off harder than any other in a forme. To prevent this inequality of impression a bearer must be fitted on the frisket.

Bearers are generally made of great primer or double pica reglets, and when laid on the forme are about a thin lead higher than the latter. They are cut about an inch long and then pasted, and laid on the furniture of the forme with the pasted side upwards. The frisket and tympan are then laid down on the forme, and an impression made, which will cause the bearer to stick on the frisket.

Cork bearers also are frequently employed, which, from their elasticity, in many cases are very useful; or paper bearers, made by rolling up and pasting pieces of wrapper.

Be careful to examine whether the frisket "bites"—that is, whether it keeps off the impression from any part of the pages. If it does, cut out as much as stands in the way of the impression, and about a nonpareil more off the frisket.

Notice if there is a dark ridge at one side of the forme, caused by the beards of the types printing at the feet of the pages. This may be caused by running in the carriage too much or too little. It may be that only the beards of a short page thus print; this may be remedied by the use of a bearer.

The proper length of the travel of the carriage is of great importance. If it be too short and the feet of the pages stand towards the platen, the hinder side of the platen will press with undue strength upon the feet of those pages. If the carriage be run in too far, the feet of the pages that stand towards the hinder rail of the tympan will

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most feel the force of the platen. According to a greater or less proportion of that force, and to the softness of yielding of the paper, tympan, and blankets, and all other springing parts of the press, will the feet of the pages and the beard of the letter print with unnecessary and mischievous hardness.

Now consider whether the catch of the frisket stands either too much forward or backward. It may stand too forward, though when it is turned leisurely up it duly stays the frisket; because, when the pressman is proceeding in his work, though he gradually throws the frisket up quickly with equal strength, yet if his estimate be wrong the catch will make the frisket return. Sometimes a solid wall does as a stay for the frisket, but in this case, if the latter be thrown up too hard it will shake and tremble from end to end, and before it gains rest, its own reverberatory motion will throw it down again.

If the catch stand too backward it will probably come down too slowly after the pressman has given it the necessary touch. Hence it will retard the progress of the work, and not unfrequently cause the sheet to slip out of its proper place.

Place the catch, therefore, so that the frisket may stand a little beyond a perpendicular backwards, that, with a proper estimate of the energy required, it may just stand and not come back. In this position, with a small touch behind, it will again quickly come down upon the tympan.

Underneath the press, and securely fastened to the floor, is a strong piece of wood called the "footstep." The pressman places his right foot against this at the moment of pulling the bar, and, slightly raising himself, obtains a swing, which adds greatly to his strength. This footstep should be placed in a situation suitable to the stature of the pressman. A tall man may allow the footstep to stand further off and lower than a short one, because his legs reach further under the carriage, and he can tread hard to add strength to his pull. A short man, on the other hand, must strain his legs to feel the footstep, and in so doing diminishes the force of his pull.

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The paper bank should be at right angles with the bed of the carriage, and at a convenient distance off, so as to avoid any unnecessary travel for the arm in conveying the sheets from the press to the bank.

The pressman brings his heap and lays it on the horse on the near end of the paper bank, as near the tympan as he can, and yet not so as to be in contact with it, and places an end of the heap towards him. He then takes the uppermost, or outside sheet, and lays it on the bank, and taking three, four, or five quires off his heap, he shakes them at each end to loosen the sheets that, with pressing, stick close together; not finding them loose enough, he will shake them longways and sideways, to and fro, till he finds he has sufficiently loosened or hollowed the heap.

Braying out Ink.—If the ink has stood long on the ink table since it was last brayed out, the surface of it will be found generally to be dried and hardened into a film, or skin. Carefully take off this film before you disturb the body of the ink; for should any—if ever so little—mingle with the ink, when the roller happens to take up the small particles of film and delivers them again upon the face of the letter, they produce picks, print black, and deface the work. If they get between the face of two or more letters, or the hollows of them, they will obliterate all they cover. If they be pulled upon, and the pressman is not careful to look over his work, they may run through the whole heap.

Having carefully skimmed off the film, bring forward a small quantity of ink near the edge of the upper part of the ink-table, and rub it well with the brayer. Care should be observed not to bray out much at a time, for if this be done it will be impossible to preserve any degree of uniformity in taking ink.

In regard to *Rolling*, what has been said in reference to jobbing work applies to bookwork, but some very important additions to those directions are necessary.

Rolling is equal in importance to any part of the pressman's duties, and if not performed properly all the care bestowed upon other operations is completely wasted.

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A careful man will never take too much ink at one time, but keep a small quantity brayed out, that he may be certain of never taking more on the roller than is necessary.

The moment the tympan is up, the roller should be applied to the forme, beginning at the bottom and going on steadily to the top, then returning. The roller should not go beyond the type matter, or it will sink into the furniture and blacken the sheet, if unprotected there.

It is impossible to lay down a rule for taking ink. All depends on the nature of the particular job and the quality of the ink. A forme of large type might require the taking of ink for every sheet; some bookwork every two sheets; light formes three or four sheets. Very fine work, again, might require ink every sheet to keep the colour of each perfectly alike.

While the roller is taking ink, the pressman should employ the time in looking over the heap, to detect any want of uniformity in the colour; to observe if any letters, quadrats, or furniture rise; that no letters are drawn out or battered; that the register be good, and the work free from picks.

When two men are working at press, one pulling and the other rolling, it is usual for them occasionally to "take turns," and alternate their occupation. Hence it is necessary for each to understand the whole routine. We therefore now revert to the subject of pulling, which is very much more complicated in bookwork than in job printing.

In order to take a sheet off the heap, the puller places his body almost straight before the near side of the tympan, and nimbly twists the upper part of his body a little backwards towards the heap, the better to see that he takes but one sheet off, which he loosens from the rest of the heap by drawing the back of the nail of his right thumb quickly over the bottom part of the heap (but in the reiteration care should be observed to draw the thumb on the margin or between the gutters, that the sheet may not smear or set off), and, receiving the near end of the sheet with his left fingers and thumb, catches it with his right hand about.

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two inches within the further edge of the sheet, near the upper corner, and about the length of his thumb below the near edge of the sheet, bringing it swiftly to the tympan, and at the same time he twists his body again before the tympan, only moving his right foot a little from its first station forwards under the table. As the sheet is coming to the tympan (supposing it to be white paper) he nimbly disposes the fingers of his right hand under the further edge of the sheet near the upper corner, and having the sheet thus in both hands, lays the further side, and two extreme corners of the sheet down even upon the further side and extreme further corner of the tympan sheet; but he is careful that the upper corner of the sheet be first laid even upon the upper corner of the tympan sheet, that he may the sooner disengage his right hand.

If, however, by a quick glance of his eye he perceives the sides of the sheet lie uneven on the tympan sheet, with his left hand at the bottom corner of the sheet he either draws it backwards or pulls it forwards, as the sheet may lie higher or lower on the near corners of the tympan sheet; while his right hand, being disengaged, is removed to the back of the ear of the frisket, and with it he gives a light touch to bring it down upon the tympan, laying at the same moment the tympan on the forme.

He then with his left hand grasps the rounce-handle, and with a moderate strength quickly runs in the table, and, as it is running in, slips his hand to the end of the bar; gently leaning his body backwards, he pulls the bar towards him, and thus effects the impression.

Having made the pull, and the rounce still in his left hand, he expeditiously returns the bar to its place, and at the same moment he gives a quick and strong pressure on the rounce to run the table out again.

As soon as he has given this pressure, he disengages his left hand from the rounce, and brings it towards the bottom of the tympan to assist the right hand in lifting it up, and also to be ready to catch the bottom of the sheet when the frisket rises.

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While the frisket is going up, which should be conveyed quickly and gently to the "frisket stay," he slips the thumb of his left hand under the near lower corner of the sheet, which, with the assistance of his two forefingers, he raises, and by so doing allows the right hand also to grasp it at the top in the same manner, which lifts the sheet carefully and expeditiously off the points, and, turning himself quickly towards the paper bank, carries the sheet over the heap of white paper to the bank, and lays it down upon a waste sheet or wrapper put there for the purpose.

While, however, it is coming over the white paper heap, though he has the sheet between both his forefingers and thumbs, yet he holds it so loosely that it may move between them as on two centres, while he twists himself from the side of the tympan towards the side of the paper bank.

Thus, both the pressman's hands at the same time are alternately engaged in different operations; for while his right hand is employed in one action, his left is busy in another, and these exercises are so suddenly varied that they seem to slide into one another's position, beginning when the former is but half performed.

Having thus pulled a sheet and laid it down, he turns himself towards the tympan again, and as he is turning gives the next sheet on the white paper heap a touch again with the back of the right thumb-nail to draw it a little over the edge of the heap, and lays it on the tympan as before, and so on till the whole heap of white paper be worked off.

When he comes to a token sheet he undoubles it and smooths out the crease with the back of the nails of his right hand, that the face of the letter may print upon smooth paper; when printed, he folds it again as a token sheet for the reiteration.

Having worked off the white paper of twelves or any sheet imposed like twelves, he places his right hand under the heap, and his left supporting the end near him, turns it over on the horse with the printed side downwards.

If octavo or similar works, he places his left hand under the heap, and also supports the outside near end with his right, and turns it over—that is, one end over the other.

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In performing this he takes from the worked-off heap as much at once between his hands as he can well handle without disordering or rendering the sides of the heap uneven—such as a token or more—and lays it upon the horse; and then takes another lift, and so successively till he has turned the whole heap.

Having turned the heap, he proceeds to make register, which he does by laying one of the sheets just printed on one side upon the tympan sheet for a register sheet, and a waste sheet over that to keep it clean from any filth the face of the letter might otherwise imprint upon it, and pulls these two sheets.

Then he runs out the carriage, lifts up the tympan, and takes off the two sheets, laying the waste sheet by; but turns the other side of the register sheet to try how the impression of the sides of all the pages agrees and lies upon the impression of the sides already printed. If he finds they agree perfectly well, the register is made.

But if, on the contrary, the pages do not fall accurately upon one another, the forme must be shifted, and driven over or brought nearer to him, in order to make the register of the pages correct.

A deviation in the register of the heads of the pages may be remedied by moving the points of the tympan either up or down; but when they are considerably out of register the forme must be moved either towards the platen or the tympan.

Having made register, he proceeds to work off the forme; but he now somewhat varies his posture in laying on the sheet. As before, in working the white paper, he caught the sheet by the upper further corner with his right hand, now he catches it as near the further point-hole as he can, with the ball of his right-hand thumb above the sheet, and the ball of his forefinger under the sheet, the readier to lay the point-hole over its respective point. Having done this, he slips himself a little backward, his right hand towards the near point-hole, with the back of the nails of his fingers to draw or stroke it over the point, and the fingers of his left hand, as they come from the

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further corner, quickly slipping along the bottom edge of the sheet till they come to the other corner. Then with the forefinger and thumb he lays hold of it in order to guide the point-hole on that point also. He then pulls the sheet as before, and so successively all the rest of the reiteration.

The token sheets are not now to be folded down as in working the white paper.

The following are some incidental hints and cautions relative to emergencies which will probably arise during the working off of the heap:—

If letters, quadrats, or furniture rise up and black the paper, put them down with the bodkin, and lock up the quarter tighter.

If any letters are battered, the quarter they are in must be unlocked, and perfect ones put in by the compositor.

When the forme gets out of register, which will often happen by the starting of the quoins which secure the chase, it must be immediately put in register again, as there can scarcely be a greater defect in a book than a want of uniformity in this particular.

If picks, which are produced by bits of paper, skin, or films of ink and grease or other filth, get into the forme, they are removed with the point of a needle or pin; but if the forme is much clogged with them it should be well brushed over with clean lye, or taken off and washed in the lye trough. In the first case, before the pressman goes on again, it should be made perfectly dry by pulling a waste sheet or two, in order to suck up the water deposited in the cavities of the letter; in the latter it must stand some time to drain and dry before he again lays it upon the press.

The puller should habituate himself to glance his eye over every sheet as he takes it off the tympan. This may be done without retarding his progress. In this way he will be enabled to detect imperfections which may escape notice otherwise.

Torn or stained sheets, met with in the course of the work, must be thown under the bank; but the pressman should be careful to have them replaced by others from the warehouseman.

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Creases and crinkles will often happen in the sheets through careless wetting of the paper; these should be carefully removed by smoothing them out with the back of the nails of the right hand.

Doubling of the impression is often caused by slack or rickety platens. The paper being too dry will also sometimes cause the impression to mackle.

Slurring and mackling frequently happen when the tympans are carelessly and suddenly put on the forme. They should always be put down easily and quietly.

If the tympan is out of order and rubs against the platen, a slur and mackle will inevitably be caused. This can easily be remedied by moving the tympan joints so as to clear the platen.

The ear of the frisket is sometimes too long, and this always produces a slur. The remedy is simple—to make it shorter.

Loose tympans at all times slur the work; great care must therefore be taken in drawing them perfectly tight.

Independently of the above causes, slurring and mackling will sometimes happen from causes which baffle all art and patience to detect. It will be better in such cases to tie as many cords as possible across the frisket, which will keep the sheet close to the tympan.

Payment for Presswork is made by the "token" and "hour." The token consists of 250 sheets; each token in ordinary work is reckoned an hour, and it is equally correct to say that a forme is so many tokens or so many hours. Thus, 1,000 is four tokens or four hours one side, eight hours or eight tokens perfect, and the price for this is so many tokens for each man; so that 1,000 in price is sixteen times the sum at which the work is paid per hour. The following table explains this system:—

Sheets perfect.	Hours.	Sheets perfect.	Hours.
250	4	1,250	20
500	8	1,500	24
750	12	1,750	28
1,000	16	2,000	32

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CHAPTER XI.

CUT WORK AT PRESS—The Successive Stages of "Bringing up" a Block—Hints and Cautions—Method of Restoring Warped Blocks—Drying and Finishing the Sheets.

WE now approach the most difficult of all the different branches of presswork. The proper "bringing up" of cuts demands patience, judgment, and an artistic faculty, which is very difficult to describe. Some men seem incapable of doing this kind of work, and equally incapable of appreciating it when it is done. There are others—and fortunately they form a large proportion of the trade—who are quite able to do the work, but who have had no opportunity of practising it, for want of the necessary knowledge of the principles involved. It is for these we write, and to penetrate the mystery with which it has very foolishly been surrounded. Week by week there is a greater demand for men who, to their other requirements, add that of being able to make ready a fine wood-cut; and when found they are always well paid. As illustrations become more popular this demand will increase, and there is no reason why a very interesting, profitable, and useful art should be placed for selfish motives beyond the attainment of any competent pressman.

Presupposing, then, that we are addressing those who are fully acquainted with the branches which have already engaged attention, our directions may be given in a more concise form than would otherwise be advisable.

The following are the different stages of the process, which must follow in the order here laid down:—

1. Take out the cuts, and pull three careful proofs of each. Let these proofs be taken on fine paper, of a good yielding surface. Highly sized or calendered paper is not suitable for the purpose.

2. Replace the cuts in the forme, and bring them up exactly type-high, by judicious underlaying. This is done as follows:—

To ascertain how much they are too low, lay one or more cards or scale-boards on the face of the wood-cut, and

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by means of a straight edge, or by feeling with the fingers of the right hand, it will be known whether the intended underlay be exactly even with the face of the letter. If it be not, other underlays must be added, and their effect tested, until all is on an exact level.

When the underlay has been made even, or level, unlock the quarter in which it is situated, and take the wood-cut out of the forme. Fit a scaleboard, or card, or whatever is necessary, to the bottom of it, and place it thus raised in the forme. To make additionally sure, lock up the forme again, pull a waste sheet upon it, to make it sink as low as it will go, and then notice whether it is a proper height. Add or take away in the same manner until a clear and perfect impression can be obtained.

If the wood-cut is too high, it must be planed low at the bottom; or a few sheets may be introduced in the tympans and cut away on the part that bears on the wood-cut, until the general impression is even. Blocks are now so well cut by the makers of engravers' appliances that this difficulty will seldom occur.

It is desirable that the heaviest of the underlays should be exactly under the solid effects of the various engravings.

Let this underlaying be done carefully, and with precision.

3. Take an impression on a sheet "of its own," on which to attach the overlays when ready.

4. Cut out carefully, with a sharp scraper, one of each of these proofs, leaving little but the heavy lines and solid effects of the subject, taking care to cut slantingly—that is, the edges must be bevelled off.

5. Take the second proof of each, and cut out in like manner all the light effects, and here and there such of the heavier as judgment shows to be expedient, shaving the overlay in all such places gradually from the heavy to the lighter parts.

6. This done, take the third proof of each, and cut out the light effects only, using discretion in shaving off partially such portions as appear desirable or proper.

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7. Next, paste slightly, very slightly, the *second* cutting, and place it line for line exactly over the *third* cutting; then in like manner the *first* cutting over the *second*.

8. Having treated all the engravings in the same way, scrutinise them critically, and scrape or shave off such portions as are likely to create an abrupt impression, or prevent the lights and shades from gradually working into each other, and your overlays are ready.

9. Next, carefully, but very slightly, paste them, only enough to stick. Note particularly two parts of the engravings near the extremities, and run a pin through each, taking care to find the same points on the tympan-sheet, and then fasten them.

The importance of extreme care in pasting the overlays line for line over each other needs no comment. The lines out of place will completely spoil the effect of the engraving.

10. Now very carefully apply the sheet to the forme, getting the lines of the proof and those of the engraving exactly over each other. Paste a little at the corners, but not over a block; pull, and the sheet will adhere to the tympan. The overlays being thus placed in position, take a sheet of tissue paper the size of the forme, paste two of the edges, above and below the make-ready, and so cover the whole for its protection.

11. Next take a proof of the forme, from which proof you will probably find that the necessities of your engravings have partially taken off the impression from the adjoining text. This you remedy with tissue overlays in the proper places; and perhaps you also discover that some portion of the cuts could also be improved with an additional overlay of tissue, or your scraper can be employed to advantage.

You may now begin to work off the forme, but if, after pulling a score or so of sheets, you find that the engraving can still be improved by the scraper or more overlays, by all means do so.

The following hints and cautions will be found very useful, at any rate to those who are experimenting on woodcut overlays:—

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In pulling the block at the first, great care should be exercised to prevent an accident. If the pull is too heavy some of the lines may be crushed, and the beauty of the block irretrievably ruined. In fact, the impression ought to be proportioned to the subject.

In order to do this in the safest manner possible, take nearly all the impression off, and then put it on a little at a time, until the lightest part of the cut comes up with a proper degree of sharpness.

It should be remembered that too many overlays are injudicious. They act almost as blankets, and get pressed into the blank places, thus rendering the lines broader than in the original engraving.

It is sometimes necessary, when the surface of the block is very uneven, to tear away some of the paper on the tympan to equalise the impression where it is too hard.

Some portions of the impression will frequently come up much too strong and others too weak; it will then be necessary to take out from between the tympans a thickness of paper and add an additional tympan-sheet, cutting away those parts that come off too hard, and scraping down the edges. Scraping away half the thickness of a tympan-sheet in small parts that require to be a little lightened will improve the impression.

The light parts require little pressure, but the deep shades should be brought up so as to produce a full and a firm impression.

Neither the pressure nor the impression in an engraving should be uniformly equal; if they be, the effect that is intended to be produced by the artist will fail, and instead of light, middle tint, and shade, an impression will be produced that possesses none of them in perfection. Some parts will be too hard and black, and other parts have neither pressure nor colour enough, but will be obscure and rough, and without any of the mildness of the middle tint which ought to pervade every part of an engraving.

To produce the desired effect, great patience and nicety are necessary.

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A few thicknesses of fine thin paper are generally required over the salient points of a picture, the outline of the part overlaid being closely followed. The edges of all pieces that are to stand in strong relief should be carefully scraped down, so that surrounding parts may not lose their individuality.

Engravings that are in the vignette form require great attention to keep the edges light and clear, and in general it is necessary to scrape away one or two thicknesses of paper, in order to lighten the impression and keep it clean. The edges being irregular, and parts, such as small branches of trees, leaves, &c., straggling, for the purpose of giving freedom to the design, may come off too hard, and are liable to picks, which give great trouble and are difficult to be avoided.

When great delicacy of impression is demanded in a vignette, it will be found beneficial, after the engraving has been rolled, to take off the superfluous ink from the extremities, by using a small piece of roller composition, on which there is no ink. This will give the edges lightness and softness, particularly where distances are represented.

When highly finished engravings are worked separately, cloth or woollen blankets, or any other soft substance, should never be used, as the impression will sink into them. Two or three thicknesses of smooth, hard paper, and even a piece of glazed pasteboard, placed in the tympan, is better.

The rollers should be in the best condition for this kind of work; and the pressman should be very particular in taking ink that but little be put on at a time, and that it be thoroughly distributed before the rolling is done, or he will not obtain a clear and uniform impression.

Should a wood-cut be left on the bed of the press or the stone for any length of time it is apt to become warped. When this happens, a very good method of restoring it to its original shape is to lay it face downwards upon the imposing-stone, with a few thicknesses of damp paper under it, and to place a flat weight of some kind upon it; in the course of an hour or two the block will be restored to its former position.

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This method is preferable to wetting the block with water, which is often practised, for the latter swells the fine lines of the engraving, and consequently affects the impression.

To retain the appearance as it comes from the hand of the artist, the block should never be wet with water; and for this reason, when wood-cuts and type are worked together, the engravings should be taken out before the forme is washed, and be cleaned with spirits of turpentine.

Lye should never be used to clean an engraving. It will be found in practice that spirits of turpentine take off the ink more rapidly, and affect the wood less, than any other article used. The facility with which the block is again brought into a working state more than compensates for the trifling expense incurred, as all that is required is to wipe the surface dry and to pull two or three impressions on waste paper.

The pressman will find it a great advantage, if it be necessary to do full justice to an engraving, to have a good impression from the engraver and place it before him as a pattern, and then arrange the overlays, &c., until he produces an effect as near equal as possible.

Stereotype and electrotype cuts can be treated in the same way as wood engravings, so far as making ready and overlaying are concerned.

On account of the cheapness and durability of electrotypes, they should always be used in preference to the originals, because if an accident should occur the plate can be renewed at a small expense, and it obviates the necessity of keeping water from the cut, as it can be washed in the same manner as ordinary type.

We have now described, at greater length and with more minuteness, we believe, than any of the existing handbooks (except those published in Germany and France, which, from their cost, and the fact of their being in a foreign language, are sealed to so many of our native printers), the art of press-work in its different branches, from the making ready of an ordinary circular to the bringing-up of the finest description of wood-engraving.

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This section of our work may be properly closed with some directions for drying and pressing the printed sheets —an operation the converse of wetting paper, which we treated as preliminary to press-work.

The paper being all printed, it must be exposed to the atmosphere a sufficient length of time to let the ink set firmly before the sheets are put in the standing press.

The poles or bars upon which the sheets are put to dry should be two-and-a-half inches wide, and made out of planks one inch in thickness.

They should be placed across the room, about fourteen inches from the ceiling, and nine or ten inches apart, resting at each end on a piece of wood fastened to the walls of the room in notches, to retain their situations. They should be kept clean, and if they have not had paper hung on them for some time, the dust must be brushed off before they are again used. As the weight of the paper would have a tendency to bend the poles, they should be turned over, as occasion may require, to keep them straight.

The number of sheets put in one place on the poles must be regulated by circumstances. If the work be in a hurry, or the weather be rainy and the air charged with moisture, no more than three or four should be hung in one place, but if the situation be favourable for drying, and the weather be warm, eight or ten sheets may be put in each place.

If the sheets be allowed to remain on the poles ten or twelve hours, it will, in most cases, be found sufficient for the purpose of setting the ink or drying the paper.

They are now ready to be put into the standing press. This is done by laying up a press-board, and putting on a pasteboard and one of the sheets of the work to be pressed, alternately, until all the sheets of paper are in the pasteboards. The pile must then be taken, fifty at a time, and placed in the centre of the standing press, with a press-board at every two reams. The press must next be screwed down tightly, and suffered to remain in that condition ten or twelve hours, when it will be found that the sheets are as smooth as they were before being printed.

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When highly glazed paper or parchment is printed, the ink is liable to be transferred from one sheet to the other. In such cases sheets of common printing paper should be put between them, and the whole put in the standing press immediately after the job is printed.

If it be wished to give the surface of the paper a glossy appearance, instead of proceeding according to the above method, each sheet of paper should be put between two sheets of zinc, to the number of twenty-five, and run forward and back three or four times between iron rollers, similar to those of a copper-plate press.

Another way is to put the sheets of printed paper between sheet iron pressing-boards, which have been heated previously, and then the whole is subjected to the power of a hydraulic press. This last process is known as *Hot Pressing*.

CHAPTER XII.

MACHINE PRINTING—General Hints for "Setting up" a Machine—The Treadle-Platen and Small-Cylinder Machines—Instructions for Starting and Working them.

To give complete instructions for working the different classes of machines used in printing at the present day would require much more space than can be afforded in a work like the present. It is, however, very desirable, in order to give this book a character for some degree of completeness, to deal with the subject, if even rudimentarily.

We propose, therefore, to exclude entirely any reference to rotary web printing, and confine our remarks to book and job printing at cylinder and platen machines. We will begin with the simplest of all—the small jobbing treadle-platen machines—and then deal with the small cylinder jobbing machines, concluding with other machines used for jobbing, book-work, and news-work—except when the latter has to be performed at a very high rate of speed.

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The economy of the machine-room is quite different to that of the composing-room. The overseer is assisted by a certain number of "machine-minders," who are journeymen who have had experience in this kind of printing, and ought to be able to set the machine going, to regulate the supply of ink and the degree of impression, and to remedy any minor accidents that may happen, as well as to "make ready" formes, and to "bring up" woodcuts. The work of supplying the machine with sheets, and of removing them when printed, is done frequently by boys, called respectively "layers-on" and "takers-off."

There are "Society hands" and "non-Society hands" in the machine department, as in the composing-room, but there is this difference in the customs of machine minders, that Society and non-Society men are allowed to work together in the same establishment. It may be well to state that the following are the qualifications required in any applicant for membership of the London Machine Managers' Society:—He must have the management of a printing machine at the time, and also have had the management of one during eighteen consecutive months. He must have served his time to the business, unless he claim his right by patrimony, which right extends to one generation only, and is only allowed where the parent has served his time under an indenture, and has thus served *three* years to the business, between the ages of eighteen and twenty-one.

Before describing the system of working any particular machine, it may be useful to repeat a few general hints more or less applicable to all.

In choosing a place for a machine see that there is abundance of light. Good work seldom proceeds from a dark corner; and if artificial light has to be depended upon, there is a very considerable extra expense added to the working of the machine.

Let there be sufficient space around the machine to enable the attendant to have ready access to any part. A large proportion of the accidents that occur in the machine-room arise from over-crowding; and we are convinced that

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however valuable ground-space may be, it is most unprofitable to pack machines together so that they cannot be "got at" for oiling, regulating, or even inspection.

Every machine requires a good, solid, level foundation. If it be not possessed of this requisite, good work will be impossible, and the machine will "jolt" itself to pieces in time. The process of dissolution may be retarded by periodical "screwing up," but the machine is being worn out by vibration instead of work; and really good performance cannot be expected of it under such adverse circumstances.

Before beginning to work a machine, care must be taken that it is thoroughly well oiled in every part that requires lubrication. The printer must acquaint himself with the position of all the oil-holes, and afterwards regularly attend to their supply of oil. This is a far more important matter than many persons unacquainted with machinery would imagine. A machine not properly kept in this way will do less work, and worse work, than it ought to turn out. It will frequently require repairs, and wear away before its time in some of its most important parts.

A variety of lubricants are used by different machine-minders, some of them being vegetable oils, which are liable to clog. If they are found to be attended with this disadvantage, they should be avoided and another kind substituted. If the holes are clogged, a few drops of paraffin oil very often dissolve the oil, and enable the holes to be cleared with a bodkin, an awl, or any other suitable instrument. The dirt should be removed with a little cotton waste.

Neat's foot oil is the most convenient, generally speaking, for lubricating both machines and presses; but it is expensive, and should be economically used. Here we ought to remind the reader that it is not only extravagant to use too much oil, but that it defeats the purpose, makes dirt, and gives trouble unnecessarily. In badly-managed offices the floor under a machine will show a series of little pools of oil, with perhaps streams extending from them to beyond the frame. A careful machine-minder will keep the floor

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sufficiently clean almost to "eat his dinner off it." He will spread newspapers under the machine to receive any drops of oil that may accidentally fall, and on removing these sheets the floor will be as clean as though no moving machinery were working above it. In some offices the space under the machines is painted (a dark stone colour is preferable); in others, a piece of oilcloth is laid down, which not only looks tidy, but keeps down dust, which is important.

Dust in a machine-room is a great obstacle to good work. It gets in the ductor and spoils the ink, surrounds the rollers and makes them work "scabby," and deposits itself on the forme, causing picks, for which the machine has to be stopped, and time lost, or the forme is injured. The floor should be thoroughly swept in every corner, the machine during the sweeping being covered with a cloth or newspapers.

The starting of the machine should invariably be preceded by a careful inspection of the oil-holes, and filling them—not to overflowing, by any means—with oil. At various periods—which the careful man will bear in mind—these holes, especially when near parts which sustain friction, will require a fresh supply of oil.

The next thing to be done is thoroughly to *clean down* the machine. If a job has just been done which requires more ink than that which is about to be laid on, the rollers must either be washed, scraped, or sheeted. In the chapter on the Management of Rollers full directions for these processes have been given.

The coffin, or bed of the machine, must be next looked to. It must be bright and polished, and contain no dirt in the corners. The work of cleaning the machine is too often left to boys, who do it carelessly or imperfectly, and cause subsequent stoppages by dirt getting on to the forme. The machine minder should always satisfy himself that his bed is clean before he lays down the forme.

The Treadle Platen Machine.—There are many different machines of this kind now in use, but they nearly all have certain general features, and differ little except in detail. We give an illustration of the "Minerva," an American

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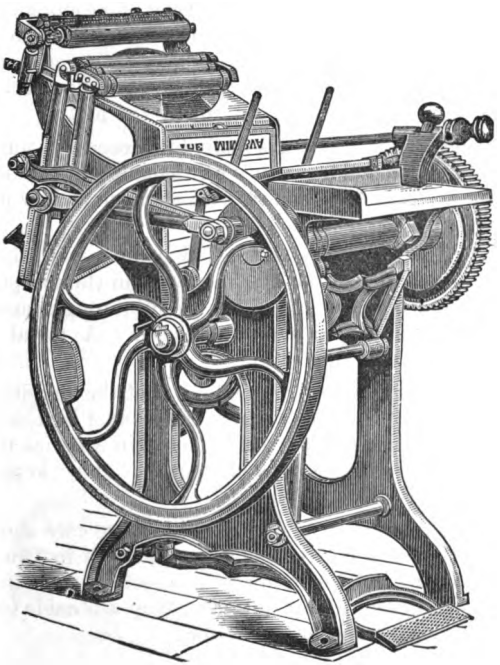
invention, which, since its introduction into this country, has become very popular. The patents having expired, the machine can be made by any engineer, and the name "Minerva" will now designate a class of machine instead of any manufacturer's speciality, just as "Wharfedale" is used to describe a type of cylinder machine.



"MINERVA" PLATEN MACHINE.

The type is placed in a perpendicular or oblique bed or coffin. The platen not only gives the impression, but receives the paper to be printed. The usual plan is to place an ink-duct and distributing table in the upper part of the apparatus. The rollers traverse the latter, and then run over the forme and ink it. While they are doing so, the platen has moved up towards the operator, so as to

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present itself at a suitable angle for the sheet to be laid on. The continued movement of the machine (which is actuated by a treadle) sends the rollers back again to the source of the ink supply; the platen and the type surface are brought together, the sheet intervening, when the latter receives the impression. The same process is then repeated. All the operations of printing are, in fact, done automatically, the attendant being required only to lay on and take off the sheets. Nearly all these machines may be driven by power, and some of them, although called "treadle machines," cannot be profitably worked at all by the foot.

Making Ready.—There is really little necessity for giving instructions for making ready on the small platen jobbing machines. It is done almost with as much facility as on a hand-press.

First of all *pack the platen.* This is done with the same object as putting in the blankets, &c., in the tympan of a press. Half-a-dozen sheets of smooth, tough, and comparatively thin paper should be used. A metal frame keeps these sheets in position.

Next put the rollers on, and see that the ink-duct is in working order. In this country an ink-duct is regarded as an indispensable part of a machine, but in America it is not so; colour for ordinary jobs is "got up" and "kept even" by the use of a hand-roller.

If a "Minerva" machine be used, some care should be taken with the revolving ink-disc. This is in two parts, each of which rotates in opposite directions. If they get locked together with hard ink, &c., they are liable to break when the machine is set in motion.

Fixing the Forme.—There are various arrangements for securing formes on these machines, but in all the use is so apparent that it is unnecessary to occupy space with a description.

The *impression* is generally regulated by four screws at the back of the platen. The attendant should be enjoined to interfere with these as little as possible; and the set nuts must be loosened before either of the four screws is interfered with.

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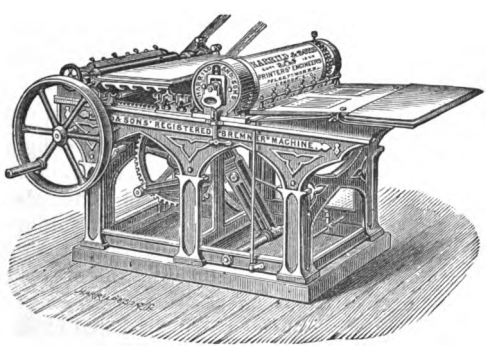
Making Margin.—This is done by marking the position of the sheet on the platen. The sheets are laid to gauges —pieces of cork glued on to the tympan sheets, or the American gauge-pins, which are very useful, and save time, or other contrivance.

Feeding.—When one boy both feeds in and takes off, he should be directed to feed with the left hand and take off with the right hand. Working some of these machines in this way is, however, very dangerous, and the operator should be cautioned to use constant care lest his hands get pinched between the platen and the forme. At the same time, he must not be frightened of his machine—that is a certain way to get hurt.

In some offices it is usual to clean all the rollers and to wash out the ductor every evening before leaving off work. This is done with turpentine. Unless the work is of a very superior kind, this practice is an unnecessary one, wasting ink and wearing away rollers to no account.

Cylinder Machines.—These differ in principle entirely from platen machines. The type forme is laid on a flat, horizontal bed or coffin, and is moved underneath a



"BREMNER" CYLINDER MACHINE.

completely or partially revolving cylinder, which effects the impression. At one end of the machine are the inking appliances, consisting of a duct and rollers for distributing

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the ink, and inking rollers, which pass over the forme as it moves to and fro with the table. At the other end are the appliances for feeding in the sheets, which are securely held by grippers while being subjected to the impression. When printed, they emerge at the side of the cylinder nearest the inking rollers, and are deposited in a pile on the taking-off board, either by the hands of the workman or by an automatic delivering arrangement called the "flyers."

When cylinder machines were first made in England, the cylinder was invariably of a very large diameter, but of late years large cylinders have gone out of fashion here, though they still receive much favour in America. We give an illustration of the ordinary single cylinder machine made in England. There are many makers of such machines, the principal and main features being the same in all cases, though the details vary slightly in each. The best English single-cylinder machines are the "Wharfedale" and the "Bremner;" the "Quadrant" and the "Ingle" are types of a cheaper class of cylinder machines.

Packing the Cylinder.—Different kinds of packing are required for different formes, as will be explained hereafter. For our present purpose we will suppose that a paper packing is used. Such a description is the most useful in a general jobbing office, as it can be adapted for almost any kind of work except large posters.

Slightly damp six or eight sheets of good tough printing paper. Paste them neatly at one end only, leaving a ridge of paste about half or three-quarters of an inch. Then take one of them, lay the pasted portion inside one side of the cylinder, and rub it with the finger until it thoroughly adheres. Stretch the rest of the sheet round the cylinder until the other end projects a little from the opposite side, and then fasten it. There must be neither creasing nor bulging in this sheet; it must be smooth, and close to the cylinder in every part.

Put on the rest of the sheets, one by one, in the same manner, taking precautions against their "bagging" or bulging. Be sure, too, that they are properly secured, and cannot come loose in the subsequent working.

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Dropping the Forme.—Run out the carriage so that as much as possible of the bed is exposed, and then lay down the forme, very carefully. If it is dropped too quickly, the table may be fractured, or some working part be injured from the sudden jar to the machine. If too slowly, the forme may burst, fall into pie, or part with some of its letters on to the table. Gentleness with rapidity is the best plan to adopt.

Before, however, the forme is laid down, it ought to be examined at the back to ascertain whether there are any letters or spaces under it, and especially to remove any dirt that may have got attached to the feet of the type. Some machine-minders rub the back of the forme with their hands, others use a rag—both of which plans are inadequate. A strong, hard brush ought to be kept for the purpose, and the forme well scrubbed. Be careful, of course, that the dirt does not fall upon the table, which is merely to transfer it from one place to another.

Centring the Forme.—Now ascertain the position in which the forme must stand on the bed in order that the sheet may have proper margin when printed. No general rule can be given for this purpose, as all depends upon the size and construction of the machine. If you are working at a new machine you may take a little pains to learn this, as you will not require to find it out by experiment again.

Three directions must be observed:—

a. The foot of the forme must be next to the ink-slab. If it be a poster, the imprint will stand there, if a sheet of bookwork the signature will occupy that position.

b. The forme must be as nearly as possible in the middle of the bed; that is to say, it should be at an equal distance in either direction from the bearers.

c. Especial care must be taken that in the first experimental arrangement it is free of the grippers; otherwise, a batter of the forme or a fracture of the grippers will be the consequence.

When you have got the proper distance between the edge of the ink-table and the extremity of the forme, cut a

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piece of brass rule as a gauge, and keep it by you for use when working subsequent formes.

Fastening the Forme.—The space between the chase and the ink-table must be accurately and tightly filled up with furniture and leads. Then the forme must be fastened, so as to prevent it being shifted by the action of the rollers or the movement of the carriage. The various expedients for doing a similar job on a press may be used for a machine; a chase or two and some furniture with a side-stick and quoins are sufficient, or one of the locking-up chases or press bars may be used. Be sure that the fastening will not "spring" in working, or the cylinder may be endangered, and equally careful that no leads, furniture, &c., are so loose as to be lifted up by the rollers. Of course it is only necessary to fasten the forme at one side, as it is not liable to move in any but a lateral direction. Then take away from the bed all quoins, letters, leads, &c., that are not wanted.

Testing the Impression.—The rollers must not be put in their places yet; it is necessary to run through a sheet or two to find out whether the impression is correct.

Arrange the grippers so that they take hold of the sheet at proper places. If the sheet is very small only two grippers are necessary to be brought into use, and these should be adjusted so as to take the sheet at a couple of inches or so from the ends. A large sheet will require three or four grippers. See that the grippers are free of the gauges, or a smash may ensue. Most machines now have a movable or sliding gauge on the paper-table. This should be at the top of the sheet furthest from the workman.

The feeder stands at the machine so that he can feed in with his right hand, and the action of the machine takes the sheet away to the *left*.

Lay the sheet to both the side and the front gauge. Then turn the fly-wheel slowly with the hands, keeping the eyes on the machine all the time, lest anything should have got loose or mislaid, or be carried in. Turn the wheel round until the sheet partially makes its appearance at the other end, but not sufficient to cause the grippers to

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entirely release it. Note the margin at top and bottom, and if it is not correct alter the front gauge accordingly. Turn the wheel round a little more and the sheet will be disengaged.

In deciding on the impression, one rule must be constantly borne in mind—adapt the impression to the highest lines in the forme, and make up—or level up—the others to receive an equal impression by overlaying. Some printers put on a heavier impression than is necessary in order to bring up the low parts. This is generally done with an idle motive, to save trouble in overlaying. It always causes bad work, unnecessary strain on the cylinder, and injury to the types. If the high lines are well brought up, the impression is right, and the next thing to be done is to begin to overlay the low lines.

If, however, overlaying can be avoided, it is desirable to do so; and the most obvious way is by *underlaying*. The great advantage of underlaying is that it makes the type-surface perfectly level, and secures even inking. If a line or a cut is very low it will not get its proper quantity of ink, and print badly, even when its proper amount of pressure has been secured by packing on the cylinder. Machine-minders resort too often to overlaying when underlaying is the proper means to adopt to save themselves the trouble of lifting the forme. Besides this, overlays are very apt to slip on the cylinder packing, and then matters are made worse instead of better. Overlays, too, are apt to defeat their own purpose. They get made into a kind of mould, through pressing on the type, and in course of time are almost useless.

Inking-up.—A good impression having been secured, a proof in ink should be taken. This necessitates the arrangement of the inking apparatus; but if a proof is wanted in a hurry the forme may be rolled with an ordinary press roller, and the inking-rollers of the machine put in order while the proof is being examined.

Now give the ductor its proper supply of ink. If there are movable stops in it, and the forme is a small one, shift them so that the table and rollers will take ink only where it will be used. Turn round the ductor roller a few

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times by the hand-wheel at the end, in order to get it completely covered with the ink given out by the knife. Then put on the vibrator and the distributors. Supply ink moderately at first, gradually increasing it till the proper amount is reached. Work the machine a few times before putting on the inkers, to get the ductor, vibrator, distributors, and ink-table in nice condition. Then lay down the inking-rollers in their places. Run through a few waste sheets till the proper colour is got up. All being right, fix on the taking-off board, and if the ink-duct has a lid turn it down. Place the heap on the board behind the feeding-board, and you are ready to begin working off.

Feeding.—Constant care must be taken to feed the sheets well up to the gauges. If this is not done the impression will not be straight, or out of the centre of the sheet. Endeavour to put the sheets in their proper place by one motion of the hand, deliberately, yet rapidly, and with confidence.

Some young persons are mentally disqualified for working at a machine, being so nervous as to be in constant dread of getting their hands entangled in the working parts. If after a short probation at machine a boy evinces this disposition he should be removed from the machine-room and placed at some other occupation.

If a sheet is backed, or printed on both sides, it conduces to good register to lay the second side to the opposite gauge to that used for the first. If this be done any irregularity in the size of the paper is obviated.

A sheet of twelves must be worked off on one side, and then the forme must be turned round on the table if there is any reason to believe that the paper is not all the same in size.

For some time after starting to work examine each sheet singly, to see that the colour is right. If it is not, regulate the rollers or the duct. Some remarks on this subject will be found hereafter.

Taking-off is such a simple operation that it does not need any explanation. It is best to remove the sheet with the left hand and keep the heap straight with the right

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hand. When large sheets are being worked, however, both hands will be required.

The job having been worked off, lift up the taking-off board, remove the forme, and either put the rollers in the forks or carry them away to the proper roller-closet. Rollers should never be allowed to stand on the ink-table. The ink-duct may now be cleaned out if it is deemed necessary, the top sheet or two of the packing removed, and the machine be overhauled generally and prepared for another job.

Some Difficulties in Machine Printing.—A deal of trouble is often experienced in getting a good impression of a card or a handbill with a rule-work border. This is often met with if the border consists of two rules with a white space between them. The cause of the creasing is the entrance of wind between the forme and the sheet. The creasing may sometimes be obviated by boring a few holes in the sides of the rules, above the furniture, but of course below the level of the face of the type. The printer should, in doing work of this kind, avoid altogether the use of a blanket on his cylinder, and use as few sheets for packing as possible. Paste these both at the entry and leaving edges, and draw them as tightly as possible.

The grippers working irregularly is another source of trouble. They bite irregularly, and when one is screwed up it seems to loosen the others, and send the sheets into the machine all awry. The cure for this is to loosen all the grippers, and when they are loose, to examine how the spring is. Get it tight enough, then fix one gripper in its place, and gradually bring the rest up as tight. Put a piece of paper under each, and see if they all bite alike. This must be done gently; it is a simple operation when properly performed.

As an ink-table for colour work there is nothing equal to white marble. Wood is dirty, while iron has often a deleterious effect upon the ink.

In printing a poster on a machine, the paper frequently cannot be got from the type, as the ink retains it. In this case thinner ink must be used. It is a mistake to try to

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thin the ink as it stands in the ink-duct; another kind should be substituted. Some machinists put a quantity of varnish into the ink and stir it up with a stick or a palette-knife. This generally spoils the ink, or spoils the work. The only proper plan is to clear out the duct and put in fresh ink. Any thickness of ink can, of course, be obtained from the ink-makers.

The preceding will have shown the tyro, it is hoped, how to work a plain, straightforward job at an ordinary gripper machine. The mode of doing fine work, the most suitable kinds of blankets, packing, &c., will be the subject of chapters yet to come.

CHAPTER XIII.

MACHINE PRINTING—News Work on a Single Cylinder Machine—Readiest Method of Working off.

WE will now suppose that a small country newspaper has to be printed on a single cylinder machine with the utmost speed, and that it is required to be got out *to time*. Let us see what is the best method of procedure in such a case.

Have the machine thoroughly cleaned down half-an-hour before the time appointed for putting the formes to press. Clear away all remains of the previous job, wipe out the bed or coffin, cleaning it of all dirt and dust, and polish it up with a little oil. Then examine the cylinder; see that there are no lumps on it, no bits of old pasted paper, no remains of packing, and, in short, take care that everything is clean and orderly.

Now get the blanket and fasten it in its place. It should be thick and clean, free from paste or lumps of any kind. Stretch it evenly over the cylinder, and secure it with pins if they are required.

Then set the grippers, if necessary, and if there are tapes, see to them. (The mode of putting on the tapes

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will be described hereafter. Young beginners should not attempt this nice operation until they perfectly understand the construction of the machine.) Examine the ink-duct, and take care that the ink there is in it is of the right sort.

Next lay a sheet of the paper to be printed on the bed of the machine, and arrange that the ink given out by the vibrator may just cover the surface, without extending beyond it.

This may be done in two ways: 1. By regulating the supply in the ink-duct. This is effected by shifting the "duct-clumps" so as to enclose a certain amount of space. 2. It may be done by cutting the vibrator which communicates between the table and the ink-duct. It is obvious that if this roller be shortened it will convey a shorter length of ink.

It is generally better to cut a vibrator, so as to keep the edges of the type clear, than to use the leaden clumps. The latter seldom fit properly, and they tend to destroy the smooth surface of the duct roller.

A vibrator once cut for a job of this kind should be put by and reserved. It will then be ready for use at any time, but if it is kept in an unsuitable place it will not long retain its suction.

This is the time for packing the roller-lifts or the cylinder bearers. The printed sheet in the bed acts as a guide, and enables you to have all the preliminary work done before the formes are laid on.*

Next set in their places the wavers and the inkers. After this, put in the vibrator, and run up a little colour. If you get too much ink on, however, the forme will get filled up, the waste will be spoilt, and the blanket dirtied. See that the inkers are just what they should be, a little soft. If they are too hard, they may be damped with a rag just before being used, but take care, before laying

* If the machine slurs at all when the impression is first put on, fasten a piece of stout paper on the bearer or on the cylinder at that spot. Do this in time for the paste to get a firm hold, for if the packing moves or rubs along the bearer it will alter the impression opposite the type and spoil the work.

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them on the machine again, that they are free of all the water and properly dried.

Put all the rollers in their places, and let the machine run for a few minutes. Then shift the rollers so as to be out of the way of the formes when they come down from the composing-room.

You may now get "the lay" right, with the sheet of paper as a guide. Then have the heap of paper upon the board, or on a stool, or some convenient place near. Get about a dozen sheets of the previous week's spoilage to run through as waste, have the machine properly oiled (lard-oil is excellent for the purpose), and feel the nuts and bolts to see if they are thumb-tight.

You will now get all the necessary furniture in its place in the bed to prevent the forme shifting. Have tools that you require close at hand, the mallet, planer, shooting-stick, hammer, screw-driver, impression pin, spanner, &c., so as to lose no valuable time in looking for any of them afterwards. You are now ready for the formes.

Plane down the formes as soon as they have been dropped on the bed of the machine.

Patching the Sheet.—A thick blanket will generally save the delay of patching a sheet, but if this must be done, a sheet or two must be pasted on the cylinder before putting the blanket on. If only one edge of the sheet is pasted it will be the gripper edge, and the other will be left to hang loose. When you want to mark the cylinder, you can slip a stout, smooth wrapper under it, and so get your sheet marked without incurring the risk of a batter, by lowering the cylinder, and in much less time than that operation would require.

If the machine were a double cylinder, of course all the preliminary work would have to be done twice over. Each cylinder would require separate treatment, and each end of the machine would have to be looked to; afterwards the whole must be considered together.

If the machine is a web or a drop-bar, or a gripper cylinder, run it gently until the joined part of each tape comes up. Inspect it. Cut off any ragged ends or threads

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that there may be, and, if necessary, sew it anew. Any worn or defective tapes must now be detected, and new ones substituted. This will save a good deal of time hereafter.

When a tape breaks it often does much mischief. Sometimes one will come unsewn, go round the rollers, and cut them through to the stocks, effectually spoiling them. Sometimes the slender tape-bars, or pulleys, are bent out of shape by becoming entangled. Endeavour to prevent the breaking by the exercise of care and forethought.

There are few accidents so annoying, and which entail such an inevitable delay. Breaking a tape will sometimes happen on the best managed machine, but its risk should be reduced to a minimum.

Although the machine-minder may get one of the boys to do a good deal of the work of preparation, he should himself see that it is actually done, as he will be responsible for any accident that may happen from his assistant's neglect.

Always have the proper spanners close by, in case any one should unfortunately get his hand entangled in the machine.

The layer-on should never start a machine without giving a distinct intimation of his intention before he strikes on, and not simultaneously or afterwards. Many accidents are caused by the non-observance of this precaution.

When the edition is worked off, the forme must be lifted, and brushed over at once with lye, and well rinsed with clean water. The formes of a paper generally have to stand aside for two or three days, and if they are not washed the ink on them will in that time have become hard, and much dust will have collected.

In regard to washing formes, it may be here remarked that in jobbing, and bookwork also, it is a good plan to have the formes down an hour or two before they are required to be laid on, and then to give them a good brush over with lye and water. The ink used in pulling proofs usually clings to them, and the slight washing given by the proof-puller is not often sufficient to remove this.

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Sometimes certain of the letters, such as o, e, s, and w, are completely filled up with picks, which must be removed before the forme is laid on the bed.*

It is seldom convenient to wash or brush over a forme when it is on the machine; either there is no time for it to dry, or for some other reason it is unwise to attempt it.

When it is absolutely necessary to wash a forme on the machine (such as when a roller has burst,† or after very long numbers have been worked), it is a good plan to wipe the whole of it out, after using lye or turps, with a clean cloth wrung out in hot water. If you have barely time to wash a forme before laying it on, but would prefer doing it, rinse it with a pailful of scalding hot water, which will loosen the dirt easily, and the heat will dry the forme in much less time than if you used cold water. Of course hot water is not necessary if you wash the formes overnight, although it always does good.

It would be a good plan if in every machine-room there were a pipe laid on from the boiler to the sink, so that any quantity of hot water might be had when required. If this pipe were so arranged that the compositor could get his galley of matter for distribution under it, so much the better. The gauge-glass should under no circumstances be tampered with to get a steam-jet for boiling water. Any proceeding of this kind should be visited with the dismissal of the offending party.

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* Some compositors have a careless habit of chalking the *face* of a forme; this should invariably be discountenanced, as it entails great loss of time in removing picks.

† When a roller bursts and spreads over the type, a sheet of paper laid on the latter, and gently rubbed with the hand, will, on its being carefully lifted, bring away much of the composition.

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CHAPTER XIV.

MACHINE PRINTING — Bookwork: Object Sought—Packing the Cylinder—Making Ready the Forme—Arranging the Rollers —Overlaying—Bringing up Cuts.

THE object of "making ready" a book forme on a machine is the same as making ready on a hand-press, to obtain a perfectly even and clear impression from the forme. If the forme itself were quite level throughout, if the bed of the press were alike level and the cylinder true, there would be no need of making ready at all; we should have a perfect impression. No overlaying and no underlaying would be required, and when the forme was laid down in its right position and inking arrangements properly attended to, nothing more would be necessary than to start the machine. These requisites, however, are seldom or never found conjoined; hence, it is necessary to remedy the defects that are encountered by what is called "making ready."

First of all it should be ascertained whether the machine is thoroughly well oiled; if it is not the deficiency should be remedied now, before actually commencing to work. Clear the oil-holes of any dirt that may have accumulated there.

Next pack the cylinder. Place on it a sheet of calico somewhat larger than the forme to be worked, and fasten the calico by the appliance on the cylinder for the purpose. In Wharfedale and some other machines it consists of a rod under the grippers, and the calico must extend entirely around the cylinder. In other kinds of machines there are bars fitting on pins extending from the cylinder. The calico is stretched by means of the screws.

The sheets of paper must next be pasted on to the cylinder. The number of sheets must be determined by experience; it ranges from half a quire to half-a-dozen, and these must be pasted together at one end and so fastened. In a Wharfedale machine the sheets are first of all fastened about an inch in the canty of the cylinder, under the

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grippers. Then the sheets are well stretched over, and lastly pasted to each other. The number of sheets depends chiefly upon the height of the cylinder bearers.

Putting on the Blanket.—The blanket must be stretched over the cylinder as tightly as possible, and fastened to the lining with strong pins. The thickness of the blanket varies according to the job to be done, as in the case of presswork.

Making Ready the Forme.—Movable formes are seldom underlaid; if very old type is used in places it must, however, be brought up by placing thin paper *under* it, avoiding the use of paste.

Formes with cuts nearly always require underlaying. If the blocks are too high it is best to reduce them by planing them at the back; if they are too low raise them to the level of the type by pasting a piece of paper or cardboard to the back.

An impression may now be pulled. Be careful that the forme is sufficiently far from the ink-table, lest the grippers come down on it and batter it. Now centre the forme by measuring the distance from the bearers to the edge of the forme. Fix in the furniture to secure the forme. It is best at this stage to ink the forme with a hand roller, and not to put on the machine rollers. Run in and out the machine very slowly and carefully.

Underlay as may be necessary, until the forme surface is brought perfectly level.

The next thing to be done is to cut the vibrating roller according to the nature of the forme that is being worked. Place the roller loosely in the sockets in which it is to be fixed, and then roll it along the ink-table on to the forme. Mark it to show the width of the pages or plates, lift it off, and cut away the composition that would cover the gutters, as well as about half an inch further, and out of the ends of the pages, to prevent the ink accumulating and making the edges of the pages "smudgy." Do not cut the composition entirely away, or the rest will be loosened; and cut it with a fine, sharp knife.

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The wavers, or those rollers that distribute the ink on the table, and that do not at any time actually touch the forme, must next be trimmed if they are new. About a couple of inches of composition should be cut off either end. The inking-rollers—which are much larger in diameter than the wavers—must also be cut and trimmed.

Packing next requires to be done. The inking-rollers have brass or gun-metal wheels on each end, which run upon bearers placed on both sides of the table. It is necessary to place "packing" on these bearers, to prevent the rollers dipping into the gutters of the formes, and then "jumping," thus leaving fryers on the impression. The packing is made of thin leather or wrapper, fastened by glue, and it is higher in the centre than at the ends, so that the roller is gradually raised to avoid the declivities in the forme. Of course the packing must be fixed exactly opposite to the places where the roller would descend. In order to prevent the blanket or paper on the cylinder dipping in the gutters of the forme, a thin piece of packing must be fastened on the cylinder in the places corresponding to those gutters. This also prevents slurs and the burred appearance of some work done by persons who neglect these precautions.

Inking Up.—Wipe down the wavers with a damp rag, and put them into the proper forks. Run the machine until the inking-table is well covered with ink. Avoid blackening the blanket, by placing a sheet of paper over the forme. About a quire of waste sheets should be worked before beginning to print the good paper.

Overlaying Cuts for Machine Printing.—The following is the plan usually adopted for this delicate kind of work:—

Pack the cylinder, and make it and all of the machine ready for the forme. Then take out the cuts, and get on a press three good proofs. The paper used for these proofs should be nice and soft, and not highly glazed.

Replace the cuts in the forme, and bring them up exactly type-high by underlaying. The heaviest of the underlays should be exactly under the solid effects of the engravings.

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Much care and precision should be used in this overlaying process.

Run an impression on the outside sheet of the packing of the cylinder, which should be perfectly tight. This impression is for the purpose of attaching the overlays to it.

Cut out carefully with a sharp knife one of each of the proofs, leaving little except the heavy lines and solid effects of the subject. The cut should be made slantingly. This done, take the second proof of each set, and cut in like manner all the light effects, and here and there such of the heavier as judgment suggests to be expedient, shaving the overlay in all such places gradually from the heavy to the lighter parts. This done, take the third proof of each, and cut out the high effects only, using discretion in shaving partially off such parts as appear desirable or proper. Then paste *slightly* the second cutting, and place it line for line exactly over the third cutting, then in like manner the first cutting over the second. This done with all the engravings, scrutinise them critically, and scrape or shave off such portions as are likely to create an abrupt impression, or prevent the lights and shades gradually working into each other. The overlays are now ready.

Carefully, but very slightly, paste them—only enough to stick. Note particularly two points of the engraving near the extremities, and run a pin through each, taking care to find the same points on the impression on the cylinder with the pins, and then fasten them. The importance of extreme care in pasting the overlays line for line over each other, and the whole, when ready, on its proper place on the cylinder, needs no comment. The lines out of place will completely spoil the effect of the engravings. The overlays being thus placed in position, take a sheet of tissue paper the size of the forme, fasten two of the edges above and below the make-ready, and so cover the whole for its protection.

Next run a few spoilt sheets through the machine and take a clean proof of the forme, from which proof you will probably find that the necessities of the engravings have partially taken off the impression from the adjoining text.

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This may be remedied with tissue overlays in the proper places. Probably some portions of the cuts may also be improved with an additional overlay of tissue paper, or the scraper may be used to advantage in removing some part of an overlay. These final matters attended to, re-adjust the tissue over all, start the machine, see to the colour, run off a hundred or so, and then examine the whole critically.

If satisfactory the work may be proceeded with; if, however, the scraper or scrap of tissue will be of service, by all means give the forme the benefit of them.

It will be seen that this process is one requiring much time and patience; without these, in fact, excellence in woodcut printing is not attainable.

Cut-work should be understood by all machine-minders, as there is so much done now in the way of illustrating books and papers. No man, however, can expect to become proficient in it unless he is something of an artist himself.

When practicable, overlays should be made several hours at least before they are wanted for use, for they harden as they dry, and work better, there being more firmness in them than when they are new, wet, and soft. Besides this, the pieces are apt to slip about in a new overlay, under pressure, and to destroy the usefulness of the appliance altogether.

The proof-puller should pull the proofs (some printers require four or five of them) on thirty-eight pound cream-wove double foolscap, which is about as good a paper as can be used for the purpose. He should not pull more than one of them quite full of colour, as it hides the work and makes the operator's fingers uncomfortably dirty as well. Try to keep the hands clean while making overlays; you then feel better fitted for doing a delicate task, and generally speaking manage to get through it better.

If the proof-puller has no feeling for cuts, you had better get the proofs yourself, as a well-pulled proof will be a great assistance to you. If you can get the artist's proof in the case of a new cut, or a copy of a previous working if the cut has appeared before, you will be saved much trouble.

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When the forme is ready, the cylinder sheet pulled, and everything prepared for the overlay, stick it on with the greatest precision, and do not shift it in putting the blanket on again. Never lay the overlay on the cut with its back pasted, and trust to running it up and shifting the cut itself to meet it. This is a slovenly way, and one that spoils the overlay, should the cut not be perfectly clean, as by printing on its face it is made so hazy that there is great difficulty in getting anything else on it as truly as it should be.

If the overlay is too stubborn, when dry, to bend to the cylinder, it should be placed in a damp room for a little while, which will soften it enough to take the required form.

If from any cause it becomes necessary to shift the overlay a little either way, it is a safe plan to mark it across with a pencil, then by cutting the top sheet of the necessary two or three sheets on the cylinder, you may take the overlay off, and assisted by the lines which you have cut through, you can stick it up again with the nicest accuracy.

When old overlays that have been used several times have to do duty again, it is as well to roughly make up an overlay three or four pieces thick and put it under them, as it tends to give the necessary pressure, and the work of the overlay is retained next to the cuts. On the other hand, a careless patchy lump placed over the face of the overlay blunts its sharpness and destroys its effect.

On platen machines the overlay is got into position by pulling the tympan sheet, and making two needle-holes through it and the parchment, including the sheet on which the overlay is to be put. This method rarely fails to give satisfaction if the knuckle-joints are tight, and do not allow the tympan to "wobble." If there is room in the joints for a thin leather washer, it is advisable to place it there. When cut-work is on there should be no looseness anywhere.

In all platen work the rules laid down by pressmen with respect to tympan, frisket, points, slurs, &c., common to both presses and machines, may be adopted. The care and attention that a good pressman bestows on a cut should be imitated also, for cuts require more than an overlay to make

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them look decent; they require careful preparation, and only a practical eye can tell when they have had enough.

Some cut hands use remarkably thin paper for their overlays, and others equally skilful use plate paper. Thin paper is not thick enough for a blanket, although for a parchment or for sheets it may do. Plate paper is apt to spread under the impression, and is more easily compressible than the paper already referred to.

After the overlays are up, and a fair sheet out, what more they require should be done on thin paper *pulled dry*. In this state there will be no shrinkage to give trouble and cause uncertainty.

CHAPTER XV.

MACHINE PRINTING—Working Portraits and Vignettes; The Blanket —Overlays—Underlays—Hints and Cautions.

PORTRAITS and vignettes require, besides more care, a different treatment to that which suffices for ordinary blocks, if they are to be properly brought up. Whatever may be said about the superiority of the press work, generally, of times past, it is certain that the art of portrait-printing by the letterpress process was never so well understood or so highly cultivated as at the present time. It therefore becomes very important to the machine-minder to be acquainted with the best systems that have so far been introduced, as the result of experience and practice, in the execution of this kind of work.

Portraits are usually printed from electrotypes. There is not so much danger in using these as in working from the wood, for if one plate gets battered another can be procured. Wood, too, is very apt to warp in the forme, and even to crack; and it cannot be washed over if it gets fouled by picks. The electro never "gives" in this way; hence it is much to be preferred to the original.

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No one can pay any attention to the illustrated journals without observing that there is a variety of styles about portrait engraving which is not to be found in ordinary figure or landscape cuts. Some portraits are engraved in a manner to imitate chalk drawings, others to imitate copper plates, in line and in mezzotint. Others depend on the legitimate effects to be had from wood engraving, and these are the most commendable. In any case, the printer must first grasp the idea of the artist, and must conform in his treatment of the block to the intentions of the artist in drawing it.

There are other varieties of portraits arising from the "colour" that is intended. Some artists will use broad, bold, sweeping lines, with the most meagre backgrounds; others adopt a more delicate treatment, and elaborate the background and the accessories. It is obvious that two blocks belonging severally to these two styles cannot be printed properly if treated alike. The portrait-printer must comprehend the manner and style of his block if he would aspire to do it any degree of justice. Hence the initial difficulty that many men experience is knowing the "style" of the work in hand, and unless a man has at least some of the artistic faculty and perception he cannot expect to become proficient at this kind of work.

We will suppose for present purposes that the portrait about to be operated upon is surrounded by letterpress matter. In such a case some printers bring up the block a little higher than the type, but this is not a good plan, although it perhaps secures better rolling. As, however, portraits are never printed to advantage on machines that have not plenty of rolling and distributing power, the advantage of working with high blocks is minimised.

Get the portrait well levelled with the type, so as to allow of the rest of the forme being evenly rolled. Next, unscrew the mount or undo the catches, so as to get the plate separate, and paste very carefully at the back of the plate the necessary overlays.

This must not be done without some thought. Let it be remembered that in the first place the engraving was level with the type, and the tendency of this underlaying

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is to bend and raise the plate in certain places. Indeed, the importance of even rolling all over the surface of the forme must never be lost sight of. Many workmen underlay to excess, and give themselves an infinity of trouble by the practice. It is best to regard the type and block as being intended to come up to an imaginary line—a certain "height to paper." If that height is attained in every part of the forme, the impression must be perfect.

If there be some peculiarity or defect of engraving to contend against, it is permissible to have the block a little higher than the line, but it should never exceed a sheet of stout wrapping-paper.

There is another element in the calculation, as to the proper height for working. If the blanket is not often renewed it becomes like a reverse mould of the cut. It may, too, have worn thin in places, owing to long numbers of small formes being worked off. The only expedient to be recommended in such a case is to take off the blanket altogether, and to level up the forme to the cylinder. When this has been done, take the blanket itself in hand, and endeavour to give it an equal consistency throughout.

This brings us to the subject of blankets, as they concern fine, delicate woodcut work. The American system of "hard-packing," which dispenses altogether with the use of blankets, will be referred to hereafter in a separate chapter.

For this class of woodcuts a pasteboard packing is most frequently used, as well as for many other kinds of fine cut work. It is not suitable for general jobbing work nor for very heavy formes—especially formes where old and new type and cuts are situated together. But if the overlaying is properly done, the pasteboard gives the best impression, enabling a far sharper edge to be given than any other "blanket" or "packing," and this is most important in portrait work. Many printers believe that a hard paper "blanket" wears away a block unnecessarily. Even if this were the fact, it would not be matter of consequence when electro is used; but it is not so. The only objection that can be really sustained is founded on the tedious making ready that pasteboard entails.

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India-rubber cloth combines many good qualities not found in other substances. In regard to density it is probably equal to pasteboard. It is generally as hard and as even as paper; it is as flexible as a blanket, and together with all these valuable qualities it possesses the elasticity peculiar to itself.

Occasionally different kinds of packing are combined together with advantage. A flannel blanket over an india-rubber cloth often turns out very superior work. A rubber over pasteboard or under paper is also well adapted to some kinds of cuts. Careful observation is, however, the best guide, and if a pressman notes the impression given by different kinds of blankets, as applied to cuts in various conditions, he will not be long at a loss for a guide as to the proper appliance in any particular case.

It is a very important point in machine printing to have the blanket of an equal thickness throughout. The texture, too, has to be carefully considered. It is not advisable to wash a blanket and hang it out "to dry," as is done with domestic blankets. But if this has to be done, the blanket ought to be well "ironed" or "mangled," as the domestic phrase goes, in a rolling-press or other similar appliance.

Take the plate in hand, and after acquainting yourself with its "style" begin the manipulation of the overlays and underlays. Raise the darker parts, and gently shave away the lightest parts—usually in the face and in the margin. Then place a blanket on the cylinder, lay a sheet of white paper on, and get an impression. Most likely the edges will be hard and the middle light. If there happens to be an old block in the page near to the one under hand, it will be found to be lower and the impression weaker. The best plan is to carefully patch the sheet to regulate this unevenness, and leave the sheet on the job as long as it lasts.

Begin on the face, and having got that right, let the edges look after themselves. The mouth is usually the most critical part of a portrait block, and a different expression may be given to a face by variations in overlaying or underlaying the mouth.

If the face has whiskers, these must be very slightly

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brought up—only a little more, in fact, than the edges and the background.

Miscellaneous Hints.—The adjustment of the bearers should be done immediately after the bed of the machine is cleaned. They should be very little more than type-high. The impression screws, if they have to be altered (which should be avoided as much as possible), should have an even bearing on the journals, and the cylinder should meet the bearers fairly.

Remember that all labour in overlaying is thrown away unless the tympan is properly stretched. The woollen or india-rubber blanket should be secured at one end of the blanket by small hooks projecting inward, and laced tightly with saddlers' thread at the other end. A piece of canvas may be sewn on that end of the blanket, wound tightly round the reel, and kept secure by the pawl and ratchet. If a paper or pasteboard packing is used, trim it down to the width of the bed between the bearers, but leave it a little longer than the impression segment of the cylinder. Then double the packing over along its length, about half an inch from the impression end, and place this doubled edge under the grippers, on the flat edge of the impression segment. Get a piece of good reglet the length of the bed between the bearers, put it over the doubled packing, and bring down the clamps firmly. The reglet should now be secure, and bind in every part. A thin web of fine linen or muslin may now be stretched over the entire surface, just as a blanket is laid on, and rolled up tightly. This will prevent any slipping of the pasteboard or of the overlays that may be attached to it.

Before beginning the actual printing of the heap on the feed-board, examine the forme again. See that it has been correctly gauged, that it is not locked up too tight, that chase, quoins, and furniture are all level, and lie flat upon the bed. The quoins must be slackened if the forme has sprung ever so little. If the type is loosened by this, it must be justified more correctly. Then attend to any picks, and remove them by the use of the pick-brush.

Fasten up the forme on the bed, so that it cannot be moved by the action of the rollers or that of the cylinder.

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The slightest movement, of course, neutralises all the work done in overlaying.

Great care should be taken in getting the first impression, for accidents often happen through thoughtlessness at the first starting of the machine. If the impression is too hard, it is sure to crush, more or less, some of the fine lines. It is better to be on the safe side and have too little impression at first, for it can be proportioned afterwards. The most correct way is to take all the impression off, and then put it on a little at a time until the lightest part of the work comes up with a proper degree of sharpness. The heavier parts can then be overlaid until the requisite amount of pressure is obtained.

Neither the pressure nor the impression in an engraving should be uniformly equal. If they are, the effect that is intended to be produced by the artist will fail, and instead of light, middle tint, and shade, an impression will be produced that possesses none of them in perfection. Some parts will be too hard and black, and others have neither pressure nor colour enough, but will be obscure and rough, and without any of the mildness of the middle tint which ought to pervade every part of an engraving.

To produce the proper effect, great patience and nicety are necessary. A few thicknesses of paper being placed over the salient points of a picture, the edges must be carefully scraped down in order that the interior parts may not lose their individuality.

Vignettes require constant care and attention to keep the edges light and clear. In general it is necessary to scrape away one or two thicknesses of paper in order to lighten the impression at the edge and to keep it clean. If the edges are irregular, and parts, such as small branches of trees, leaves, &c., are left straggling for the purpose of giving freedom to the design, they are very liable to come off too hard, and are also apt to make picks, which give great trouble, and are difficult to be avoided.

When great delicacy of impression is required, it will be found beneficial, after the block has been rolled, to take the superfluous ink from the extremities with a small piece of composition without any ink on it.

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The rollers should always be maintained in the best condition for this class of work, and in using the ductor-screws great care should be taken not to put on too much colour at a time. It should then be thoroughly distributed before the inkers are put on.

Woodcuts left on the bed of the machine or on the imposing surface are very liable to become warped. When this happens, a very good method of restoring them to their original shape is to lay them face downward upon the imposing surface, with a few thicknesses of damp paper under them, and to place a flat weight of any kind upon them. In the course of an hour or two the blocks will be restored to their former condition. This method is preferable to damping the block with water, which is too often done, swelling the fine lines of the engraving, and consequently affecting the impression. To retain the appearance as it comes from the hand of the artist, the block should, in fact, *never* be wet with water. Hence, when woodcuts and type are worked together, the engravings should be taken out before the forme is wet, and cleansed with spirits of turpentine.

Lye should never be used to clean a wood engraving. It will be found in practice that the turpentine takes off the ink more rapidly and affects the wood less than any other detergent that could be used, while the facility with which the block can be again brought into a working state more than compensates for the trifling expense incurred. All that is then necessary is to wipe the surface dry and to pull two or three impressions on waste paper.

It is customary to use one roller during the process of making ready for fine machine work, while the rollers intended for printing are put up when the proof is pronounced correct, and the machine-minder is ready to proceed with the printing of the forme. The reason of this practice is that the rollers are liable to get out of order during the time occupied in making ready.

The machine-minder should accustom himself to looking over the sheets for some time after the working is begun. In this way he may not only observe any want of uniformity

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in the colour, but also detect any imperfections which might otherwise escape notice.

Torn or stained sheets met with in the course of the work should always be thrown out. Creases and wrinkles frequently appear in the sheets when the paper has been carelessly wetted. These imperfections should be carefully removed by smoothing them out with the backs of the nails of the right hand.

The paper by drying at the edge often causes a slur. This must be remedied by wetting the edges of the heap frequently with a sponge. The heap should invariably be damped when leaving off work, either at dinner-time or at night.

Before leaving off it is also advisable to cover the heap by first turning down a sheet, like a token sheet, to show at what point the working-off was suspended. Then put a quantity of the worked sheets on this sheet, with a wetting-board on the top.

A very good gauge for the height of the bearers is a new shilling placed on end. When the bearers are properly regulated to the cylinder, the workman may have confidence in placing as many sheets on the latter as may be necessary. The adoption of such expedients as placing pieces of wrappers along the bearers or along the cylinder is always indicative of clumsiness or inexperience on the part of the workman.

Constantly tampering with the impression screws is to be deprecated. They are thus brought down so hard that they deflect the coffin, or elevate the cylinder, and cause slurs.

The same remark applies also to the screws in the ink-duct. When the colour is once set, the machine-minder should endeavour to leave it alone as much as possible. If a roller does not supply the type sufficiently, it is of little use opening the duct. The more judicious plan would be to change the roller for one better adapted for the work in hand.

If there is a light place, such as a blank page, in a forme, some persons screw up the knife until it "cleans" or

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brightens the duct-roller in that part. This practice tends to ruin the duct, and probably to spoil the work, for the tighter one end is screwed up, the looser the other is, and the greater the amount of ink given out.

Generally speaking, there is no branch of the printing business requiring more constant, untiring care than that appertaining to the management of machines, and certainly none in which momentary carelessness, heedlessness, or inattention entails such serious consequences. We have endeavoured, in the previous remarks, to give advice applicable to the most ordinary emergencies, as well as to point out the best mode of working in order to avoid accidents. We would at the same time caution the machinist against the belief that anything like a complete knowledge of his trade can be acquired from a book, however practical and lucid its author may endeavour to be.

CHAPTER XVI.

MACHINE PRINTING—The American Hard-packing System—Theory of Blanketing—American Practice as to Covering the Cylinder—Working from Stereos and Electros.

WITHIN the last few years the Americans have been able to produce effects, especially in woodcut and colour work, decidedly superior to anything previously done in this country. This is due to the system of making ready, technically called "hard-packing," practised by them.

Hard-packing is practicable only when the most perfect machinery and types are used. American machines are, generally speaking, much heavier than our own, and more capable of withstanding heavy pressure with safety. They are more expensive, and constructed with greater care. A few years ago it was thought that the large cylinders were the most suitable for fine woodcut printing, as they more nearly approached the plane surface, which was thought to be the best for this class of work, than small cylinders. A change of opinion, however, has since taken

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place, and small cylinder machines are now used in the best offices of the United States.

The type used when hard-packing is resorted to must be new, or at least unworn. If an overlay is necessary for any of the lines, a more or less yielding blanket must inevitably be used.

To prepare a cylinder machine for ordinary jobbing work, put on a rubber blanket, over which draw lightly a strip of fine muslin. The ratchet wheel and shaft provided in the recess of the cylinder enable this to be done with facility. Next paste a sheet of damp paper on the upper and lower edges, and place it on the impression surface, where it will dry quite tightly in a few minutes, and present a clean surface for the "make-ready."

Now take an impression on the so-far prepared cylinder. If the impression screws are properly set, a slight overlay of tissue paper here and there will be sufficient, and the job can be gone on with.

If, however, the job calls for a higher class of press work, hard-packing is substituted for the rubber blanket. This hard-packing consists simply of two or three thicknesses of ordinary glazed boards.

Let the pressure boards be as nearly as possible the size of the blanket. Apply a straight-edge about two inches within the long edge of each board, cutting the outer surface of each very slightly, so that they will bend over very squarely. See that it bends quite close and solid where the impression commences, or a slur will be inevitable.

Next add as many sheets of good white paper as will bring up the thickness of the packing to that of the blanket, and cover the whole with a sheet of strong, even paper. When this is done properly, the packing will be found to lay as close and solid to the iron cylinder as if pasted sheet by sheet. Upon it the pressman may make ready his forme with absolute certainty and facility.

This system of hard-packing is considered to be the only means by which an absolutely clear surface impression can be obtained.

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Two cautions are necessary. In the first place the circumference of the cylinder and the travel of the bed must be in exact harmony; hence, care must be taken not to pack too much. If the packing is too thick, the circumference of the cylinder is made larger than it should be, and out of harmony with the forme surface, resulting in a drag or slur. A little judgment and experience will, however, prevent this difficulty.

To make ready the job, paste a suitable sheet of thin paper slightly on two edges, and place it where the impression falls. In a few minutes the paper will dry as tight as a drumhead, when the machine can be run through and an impression taken.

The wood bearers of the machine must always press up to the bands of the cylinders; and the bearers must be of sufficient width and strength to carry the cylinder round after it is started by rack and wheel. This is of great importance in hard-packing.

Another point to be clearly understood is that the paper must always be worked dry. Damp sheets are liable to cause the packing to swell and blister up. A great saving of ink is effected by having the paper rolled on one or both sides, according as the job is to be perfected or printed on one side only.

To prepare engravings with their overlays for printing in this manner is a somewhat delicate operation, requiring care and patience. The following is the plan adopted in America:—

Take three careful proofs of the woodcut on a fine-surfaced paper, moderately thin. Next cut out, slantingly, all the light portions of No. 1, and set it aside to build upon. Then cut out proof No. 2 a great deal more, according to the character of light and shade, and the judgment of the operator. Fix what remains with as little paste as will hold it exactly in position over the first proof. Finally, cut out such heavy portions of proof No. 3 as may appear judicious. Paste them also in exact position. The overlay is now almost complete; but it may need a little dressing with a sharp penknife of the "eraser" shape.

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Having got the overlay ready, place it in exact position on the cylinder and over the impression, with as little paste as will cause it to stick. Now run through ten or a dozen spoiled sheets, and take a clean impression for critical examination. With the scraper and a few pieces of tissue paper give it the last touches. Finally, paste by the upper and lower edges a sheet of manilla tissue paper over the entire make-ready—an excellent precaution against displacement.

A finished overlay is thus built up that so operates on the impression of the engraving as to bring out the shadows and throw up the high lights of the picture, with the effect originally contemplated by the artist.

By this method the pressman is also enabled to "cover" with the least possible amount of ink, which is a leading feature in artistic presswork. Engravings vary so much in their general character that the pressman must possess a quick perception of what is demanded by each particular cut, and modify his treatment accordingly. An excellent plan is to keep before him the engraver's proof, and be guided by it in the amount of building up.

If a woodcut is to be printed with other matter, it will probably, when in position and the overlays fixed, be found to bear off the impression somewhat from the adjoining letterpress. As the engravings are first in order they must be first attended to, and the letterpress brought up afterwards to the required height by tissue paper.

An American writer thus expounds the theory of the hard-packing method. "Fine presswork," he says, "is the art of printing perfect impressions from the *surface* of type or woodcuts in relief. The subject transferred to paper should be an impression from the surface, and the surface only, of the types or engraved lines, of such a tone as to produce all the effect of which the subject is capable, without either superfluity or deficiency of colour. This effect cannot be perfectly obtained by the use of a substance like the ordinary felt blanket, which gives a *light* and *weak*, as distinguished from a *firm* and *even* impression. On fine work a rounding impression such as given by the felt blanket should be avoided; it thickens the hair lines of

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type, and destroys the fine lines of engravings. Of course, an impression that does not indent the paper is preferable, but the indentation of the paper is no test of the force of the impression. A light impression from a woollen blanket will show more forcibly than a strong and even pressure from a paper or hard-packed cylinder. Type and engravings are worn out, not so much by the direct impression of the platen or cylinder on the flat face of a forme, as by a grinding or rounding impression on the edges of the type, caused by the forcing of the blanket between the lines and around the corners of the type or engravings. When the type is new and the make-ready material packed hard and smooth, the impression can be made so flat that it will not show on the paper."

Summing up the merits of the old system of soft-packing and the new of hard-packing, the same writer adds that "a woollen blanket is best adapted for old type or stereo plates, for posters, and all common work, which only requires a clear impression. Hard-packing is not suitable for miscellaneous work, nor for formes of mixed old and new type. Rubber-cloth is the best for such work; it combines more good qualities than are found in any other substance. It has something of the density of the glazed boards used in hard-packing, the hardness and evenness of paper, and the flexibility of the blanket, with an elasticity peculiarly its own. In some cases, where good presswork is required from indifferent materials, a combination of thin rubber over glazed board or under paper may be used. Upon a proper selection of the make-ready material for the kind of work in hand, good presswork in great measure depends; and careful observation will generally teach the pressman to select and combine his materials to the best advantage."

The preceding directions are chiefly from the pen of Mr. John Henry, of New York, who is reputed to be one of the best pressmen in America, but some particulars have been added by Mr. Robert Hilton, a very able and practical London printer.

Among the earliest to recognise the deficiencies of the old systems of making ready and to suggest improvements

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was Colonel Hoe, the son of Robert Hoe, sen., who was the inventor of the celebrated printing machines which bear his name. He was so successful that the American founders discarded platen machines for the production of their specimen books, adopting the hard-packed cylinder as best suited for fine printing. This was a decided triumph for the cylinder press, and the surest evidence of its availability for the highest classes of artistic printing. Every interest of the typefounder depends on the perfection with which his specimens are introduced to the trade, and the firm which issues the most beautifully printed specimen book is regarded as being the most likely to do the largest business. The following remarks are condensed from one of the publications circulated by the firm of R. Hoe & Co., in America.

In the United States what serves the purpose of the blanket on the hand-press is generally called the tympan. Accordingly, the article commences with the obvious observation that the tympan should be selected to suit the class of work to be done, as upon this matter the perfection of the work in great measure depends. Comparing the different substances used, and their advantages respectively, it is stated as the result of experience that the India-rubber blanket is best adapted where the press has to be used for all kinds of work, and when it is not found convenient or profitable to change the tympan with each succeeding forme. It combines in a measure the quality of nearly all other tympans, and where it is designed to print bookwork, posters, and general job and newspaper work on the same press, no better tympan could be obtained.

A tympan made of fuller's board or packing is most suitable for new type, woodcuts, and the finer kinds of press work. A proper making-ready on this surface will show a more delicate impression and a sharper outline than can be obtained with any other; and it will not wear the type round on the edges, and is less likely to dull the hair lines on type or cuts. It requires a nice discrimination on the part of the pressman, and very elaborate making ready, to attain good results.

Tympans made of thick paper are more generally used

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for bookwork, and for the lighter kinds of jobbing, such as script circulars, cheques, &c. Paper is very serviceable on formes where the type is slightly and uniformly worn; it does not require the patient making ready of the hardest tympan, nor is it so destructive to the type as the softer kinds of tympans.

For posters, with wood type, old stereotype plates, or type which has been much worn, a woollen blanket is best adapted, and may be used on all kinds of common work, which requires only to be brought up fairly, as such formes can be made ready more quickly with this than with any other material.

The preceding directions are only given as general rules; pressmen in America very often combining these materials or using others, according to the kind of work in hand, being guided in such matters by experience and judgment.

In regard to the fixing of the tympan or blanket, it is advised that it should be stretched very tightly over the cylinder, so as to present a smooth, even surface, the time and labour spent in making ready being but thrown away if the tympan is loose in any part. A woollen blanket is secured at one end by the clamps on the impression segment of the cylinder, wound round the reel at the other end, and tightened with the pawl and ratchet. A rubber blanket, being less pliable, should be secured at one end of the cylinder by hooks and holes punched in at the other end, about two inches apart, so that a piece of canvas may be sewed on and wound around the reel in the same manner as the woollen blanket.

Packing, or paper, should be creased at the end and laid on the flat edge of the impression segment of the cylinder. A piece of reglet should then be laid on the crease, and all may be secured by bringing the clamps down on the reglet. A piece of fine muslin should then be laid over all, and secured in the same manner as a blanket, which will prevent a shifting of the overlays or tympan.

The remarkably glossy appearance of the ink in the best American press work, especially periodicals with woodcuts,

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is owing more to the splendid surface of the paper than to the superior excellence of the ink itself. It is to be regretted that paper of a similar quality is so little used by English publishers. Rolling and pressing, which also conduce materially to the exquisite finish attained by some American specimens of printing. will be referred to in a subsequent section devoted to the warehouse.

In preceding chapters we have given directions for bringing up cuts of various kinds, which is a part of the duty of the machine-minder, although in some very large establishments men are engaged exclusively upon this operation. In the general run of business, however, woodcuts are seldom printed from. There is great danger in working with them, as they are liable to be battered or to get warped. In the first case they must be "plugged"—that is, the damaged part must be cut out by the engraver, a new piece of wood put in, and this re-engraved with the deficient portion of the subject. If warped they give a good deal of trouble; and it may be useful here to state how a warped block can be reduced to its original condition, if it is at all capable of being so reduced. The arched part may be laid downwards on a damp blanket or piece of wrapping-paper; a weight may then be placed upon it, and after a short time it may be found restored. It is not wise, as already stated, to wet the block with water.

For these reasons the original woodcuts are comparatively seldom worked from, and electros are used. If slightly battered by accident these may generally be restored by being beaten lightly on the back; but if completely ruined, a new one may be obtained at comparatively small cost. Stereos are used as well, but for various reasons, especially the fact that they rarely give as sharp an impression as electros, the latter are preferable. The mode of working from both is the same.

Although completely mounted stereo plates of news columns, and single electros of small blocks, are used, bookwork plates are not generally mounted. They come from the foundry about $\frac{1}{8}$ or $\frac{1}{6}$ inch in thickness, and require to be brought up type-high with mounting-blocks or "risers." Of these risers there are a great number of

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varieties. The old-fashioned style consisted of two pieces of mahogany, with brass catches at the sides to secure the plates. Their faults were that they would not always lock up level when dry, and were always liable to warp when wet. Hence they were superseded by metal risers, cast to various sizes of book-work, such as 8vo, 12mo, 18mo, &c., brass catches being also affixed to them.

The metal riser will be found to be in several pieces, some larger than others. Get one of the plates to be worked off and make up a bed for it, according to its size, using the largest pieces first, and adding small ones as necessary. The bed must be about a long primer larger on all sides than the plate, because there must be room for the catch. Now make up the mounts for all the other plates contained in the forme in the same way. Put a catch at the top, one at the bottom, and one at each of the two sides.

The next thing to be done is to arrange these pages on the coffin of the machine—that is to say, to impose them. Instruction has been given on the subject of imposition in the section of this work relating to COMPOSITION.

After the pages are got in their proper places, the machine-minder must make margin. This subject has also been treated of in a former section of this work. Next see that the plates as they stand on their mounts are type-high. If they are not they must be underlaid. This must be done carefully, as any carelessness or deficiency in this respect cannot afterwards be remedied by overlaying—at least, not satisfactorily.

Ascertain also that all the plates are in a line one with another—that there is not too much space between some and too little between others. This may be done by laying a straightedge or a brass news column-rule along the edges. Begin with one row, and regulate the others accordingly. Then put in the furniture and lock up the forme.

In large houses formes of mounts of regular sizes are kept ready locked up, and only require to be unloosened, the plates laid down in their places, and re-fastened up again, when they are ready to be worked from.

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After stereo plates have been printed they should be washed over with potash and rinsed with water. Electro-plates and woodcuts should, in addition, be slightly oiled and packed up in paper. Unless so oiled, electrotypes will in time become covered with verdigris.

Hitherto we have been speaking of the management of single cylinder machines. There are, however, several other kinds of machines, and each of these requires a different treatment.

CHAPTER XVII.

MACHINE PRINTING—The Platen—The Perfecting—Two-Colour Machines.

THE *Platen Machine.* In working these machines the first thing to be done is to cover the frisket with cartridge or brown paper, the former being preferable to the latter. Next cover the tympan with parchment. Cut the piece somewhat larger than the frame, paste the edges well, and turn them in about a couple of inches. Let the parchment dry; then damp the unpasted part, which will cause the whole, when dry again, to become tight and free from wrinkles. As in the case of presses, the smooth side should be kept outside. Sometimes a piece of linen is used for covering the outer frame of the tympan, as the platen of the machine is liable to cut the parchment, which is expensive. Let the frames stand in the air to dry; then put on the tympan and frisket. There are pins provided for the purpose on the knuckle joints. Let these be securely fastened, or the frames will come loose in working. Between the two tympan frames some sheets of paper must be placed, and these must be sewn to the parchment at the top end, so that the sheets will not be shifted by the action of the tympan.

The forme must next be placed in the exact centre of the coffin; this is very important. Now lock it up so that it will be kept tightly in its place. Plane the type; be very careful that there is nothing underneath the forme.

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The next step is to get a pull of the forme on the frisket. Roll the type with a hand roller if the machine rollers are not yet inked; but one of the latter may be used if they are already inked. Run the frisket and tympan under the platen; this it is best and safest to do by hand, by backing the machine. Get a light impression of the type on the frisket; the lighter the impression the better. Then cut the marked parts out, making the holes a little, say $\frac{1}{8}$ inch all round, larger than the type, so as to prevent the frisket "biting" the impression. As the sheet of paper will be greatly weakened by the pieces being cut out, it is necessary to strengthen it. This may be done by placing tapes over the parts that are left. Fasten the tape to the frame at one side, bring it along the sheet and round the other side, ending it at the place where it commenced. Then melt a little roller composition, and fasten the sheet and the tape together here and there, to prevent "bagging," and the whole will be strong enough to begin working. In order to prevent the sheet touching the type before the platen comes down it is well to use bearers; bits of cork fastened to the tapes will answer the purpose.

The forme having been levelled and adjusted, as described for working plates on a cylinder, fasten on the points to the top and bottom of the frisket. Back a sheet, and ascertain whether the impression registers; if it does not, the points must be shifted. If register cannot be got in this way, the forme must be unlocked and the furniture altered.

Next run up colour, and pull a revise. This must be sent to the press reader or machine reviser to be passed. While he is examining it, pull a sheet for patching. Then paste overlays on those parts of the tympan where the impression is too light. The places where there is too much impression must be cut out. If there are cuts in the forme, lay the overlays, pasted side up, on the top of them. Having got the overlays attached to the sheet, it may be placed inside the tympan, between the parchment and the sheets of paper.

Great attention must be paid to the colour when working on a platen machine, as it is more liable to become defective than on a cylinder machine. A few sheets should be run through the machine, and the ink thoroughly distributed

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over the rollers, the forme, and the inking-table. It will soon be seen whether there is any inequality of colour in portions of the forme, and this must be remedied by altering the screws of the ink ductor. When this is seen to, working off can be proceeded with.

In working a platen machine the paper is liable to get creased, through the air getting in between the forme and the tympan. To prevent this, place pieces of cork on the top corners of the frisket, by which the tympan will be prevented from coming down so suddenly.

In regard to the regulation of the impression, it may be said that great care must be used to avoid breaking the machine itself. There is a limit to the pressure that may be put on, and if exceeded, damage must necessarily be done. Sometimes a light forme is placed at one end and a heavy one at the other. The pressure must be equalised by an alteration in the number of sheets on the tympan.

A piece of paper folded up, or a bit of cork, stuck on the cross-bars of the tympan will prevent slurring. Blank pages should have a bearer placed alongside them; this must be securely fastened.

We now come to *Perfecting Machines*—viz., those which print the sheet on both sides successively before it is delivered. This is effected by having two impression cylinders, one for each forme. Between them are two drums, which turn the sheet from one side to the other, so that it receives from the second cylinder the impression on the opposite side to that printed by the first cylinder.

Of perfecting machines there are three kinds—the drop-bar, the gripper, and the web, which distinguish the system by which the paper is taken into the machine, or the feeding arrangements.

The *Drop-bar* is the simplest of any. Along a steel rod several round pieces of metal are arranged. They are movable along the length of the bar, so as to adapt them to the size of sheet to be fed in. The bar itself rotates by means of the tapes, and there is a contrivance whereby, when a sheet is presented, it drops slightly, thus squeezing

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the sheet by the discs already mentioned, and conveying it to the tapes, whereby it is carried through the machine.

In a *Gripper Machine* the grippers are secured on a bar inside a drum. The paper is stroked down to marks on the laying-on board, and the grippers take hold of the sheet and convey it to the tapes.

In a *Web* machine there is an arrangement of tapes whereby a sheet is laid down on them and carried forward.

The working of these machines can only be practically learnt in the machine-room itself, but it may be desirable to state the order of the operations.*

The calico is first of all put on the cylinders, for common or news work a blanket being added. This blanket must be pinned to the calico, and the tapes then put on. This is an operation of some nicety. For the outer forme, the reel of tape is placed on the laying-on board. One end is then inserted so as to go round the drum under the drop-bar, then carried through the machine in the following order—1, the inner forme cylinder; 2, over the first large drum; 3, under the second drum; 4, over the outer cylinder; 5, round the wooden roller; 6, under the various tape-bars, backward to the point of starting. The junction of the two ends must be made near the feeding-board, and they must be neatly sewn together. Pin a tape to the end of that already put up, and the other end tapes may be drawn in.

Next put in the inner tapes. Begin as already described; then proceed thus—1, over the inner tape-bar; 2, under the inner forme cylinder tape-bars; 3, to the reels over the inner forme; bring the other end under the laying-on board, and join the two ends at the tape-reels.

Set the tapes so as to take in the sheet, according to its size, and run the machine, when the tapes will take up their proper position.

* To give detailed directions for working large machines would unduly extend the scope of the present work; and, indeed, is rendered unnecessary by the issue of two books which ought to be in the possession of every machine minder. One is "Difficulties in Machine Printing, and How to Overcome Them," by Frederick Noble (London: J. M. Powell & Son). The other is "Typographic Printing Machines and Machine Printing," by Fred. J. F. Wilson (London: Wyman & Sons). A useful "List of Technical Terms relating to Printing Machinery" is also issued by Messrs. Wyman.

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Now lay down the inner forme on the centre of the coffin, and so that the tapes fall on the furniture of the heads or gutters, not over the type. Fasten the inner forme and put on the outer forme, running the machine gently to ensure the tapes being in their proper position. Get the register right, and then overlay the forme; afterwards put on the rollers and commence working off.

Two-Colour Machines are those in which the cylinder is placed in the centre, and there are two coffins to contain the two formes, and two complete sets of inking apparatus—one for each colour. The cylinder makes two continuous revolutions, one for each forme, and the sheet is not released from the grippers until both impressions have been made; thus it is printed twice on the same side, and perfect register is secured.

As in the case of other machines, the calico must first be put on, and for heavy news or poster work, a blanket. The first forme is then laid on and locked up, and the second forme afterwards placed in position—each in its proper coffin. A sheet is pulled to ascertain whether the position is correct. The ink is got up by being put in the ductors, the distributing rollers in their forks, and a few sheets run through. The overlaying is afterwards done, and the machine is ready to begin work.

The most solid forme should go on the first coffin, so as to print first. The ink should be used so that the sheet may not be torn in going through the machine. The paper must not be too much damped, or it will stretch, and prevent proper register being made.

Rotary Machines are those in which the printing surface (usually a stereotype plate) is cylindrical, and revolves while the white paper is being presented to it and pressed by the impression cylinder. We cannot here attempt to describe the complicated method of working these machines, which, indeed, is only confided to very experienced and trustworthy machine-minders.

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CHAPTER XVIII.

COLOUR PRINTING—Choice and Arrangement of the Colours—Theory of the Harmony of Colours as Applied to Printing.

IT is, no doubt, quite possible for one who has no knowledge of the rules of grammar to write good poetry and elegant prose; for one who has no knowledge of the principles of perspective to paint a pleasing picture. This, however, is no reason why the *littérateur* or the artist should neglect the principles of grammar or perspective. An acquaintance with the latter will afford him the satisfaction of knowing why a certain form or style is adopted, will invariably give him confidence in his work, and will often save him from blunders and anachronisms which would immediately betray his ignorance of the theory of the art he practises.

In the industrial arts, hitherto, when a result obtained has been at all "passable"—to use a very objectionable word—inquiry has seldom been made into the principles by which that result was obtained, although such an investigation would in itself be highly valuable, with a view not only to secure a repetition of the achievement, but the possibility of even surpassing it. In printing, for example, there are certain men who have a reputation for colour work on account of the correctness of their taste and their ingenuity in the disposition of the different colours. In nearly every case this facility is the result of an intuitive appreciation of the principles of harmony and contrast of colours, and rests on no knowledge whatever, theoretical or scientific. In most cases, in fact, it is nothing more than the "rule of thumb," and the person possessing it can neither analyse nor explain it, and is utterly incapable of imparting it to another. The attention which is being paid to technical education has done much to discredit this state of things, and to induce men to ask constantly "the reason why" they are working in a given way, and the "reason why" they expect a certain result.

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We are about to treat the subject of COLOUR PRINTING under three heads, as follows:—

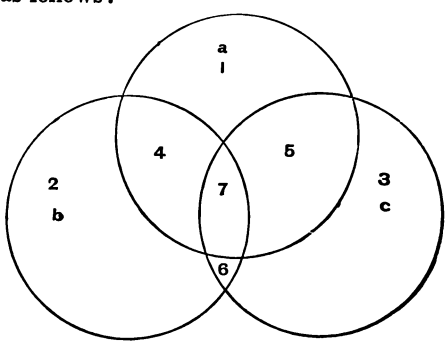
1.—The choice and arrangement of the colours.

2.—The preparation of the inks, varnishes, &c.

3.—The method of printing.*

And we find it necessary to commence with the *theory of colour*, as practically applicable to the different shades of inks that may be used in a given job, in order that the young printer may understand the scientific principles upon which this beautiful art depends.

Combinations of Colours.—Let the reader begin by drawing three circles, arranged like those in the annexed diagram. Let him then colour them in transparent water-colours as follows:—



The whole of the space bounded by circle *a* in lemon yellow.

,, ,, ,, *b* in lake.

,, ,, ,, *c* in dark blue.

He will then find that where the colours overlap each other a remarkable effect has been produced. The parts numbered 1, 2, and 3 will of course be respectively lemon yellow, lake, and dark blue, as they are untouched by other colours; but that marked 4 will be orange; 5, green;

* The best and fullest work on this subject is that written by Mr. Frederick Noble, entitled "The Principles and Practice of Colour Printing stated and explained." Messrs. J. M. Powell & Son are the Publishers.

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6, purple; and 7, a neutral tint—apparently black. Thus by the use of *three* pigments we have obtained *seven* distinct colours; and if this diagram were printed in chromo-lithography or typography we could by three workings have seven varieties of colours.

Let us now inquire into the cause of this phenomenon. The laws of the science of optics show us that there are three *simple* colours, *yellow*, *red*, and *blue*. They are called "simple" colours because they cannot be produced by combination with others. If we mix them, however, certain other colours are produced, which are called *secondary*. They are orange, green, and violet—the circumstances of the combination being—

Orange, produced by the admixture of red and yellow;

Green, by that of blue and yellow; and

Violet, by that of red and blue.

In the preceding diagram we find, in addition to these colours, a black space. This is caused by three colours coming together and upon each other at that place. All the colours, it should be understood, can be caused to give black when certain others are added to them, and these are called their *complements*. Thus, red upon green, or yellow on purple, or blue on orange, will give black; and these colours are respectively complementary.

But besides different colours there are *tones* of colours, or different degrees of intensity. Thus, green may be varied from light to deep green, and blue, orange, &c., may be almost infinitely varied. By mixing colours with white, *tints* are obtained; by mixing colours with colours, *hues;* by mixing colours with black, *shades*. It is well to just impress this distinctly upon the memory, as reference to it will occasionally be made hereafter, and the proper use of the terms tends to accuracy and conciseness in description.

Tones	...	... Degrees of intensity.
Tints	...	... Admixtures with white.
Hues	...	... Admixtures with other colours.
Shades	...	... Admixtures with black.

It is common enough to speak of hues and shades and of

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tones and tints as almost synonymous and interchangeable, yet their respective meanings are very distinctive, and a confusion in the signification attached to them leads often to very inconvenient mistakes.

If you take a piece of red paper and look at it steadfastly for some time, and then look at a piece of white paper, a patch on the latter will appear as if it were coloured with *green;* or if you place a red wafer on a sheet of white paper the same effect will be visible. Other colours in certain combinations give effects of the same kind, and the colours produced in this way are called *complementary*, just as the black already mentioned. By experiment in this way we would arrive at the following:—

1. Green is complementary to red, and red to green.
2. Blue is complementary to orange, and orange to blue.
3. Violet is complementary to greenish yellow, and greenish yellow to violet.
4. Indigo is complementary to orange yellow, and orange yellow to indigo.

Let us now consider the effect of black letters on coloured grounds, which is the mode in which the application of these principles touches printers. The black letters obviously have a different effect to that presented when they are worked on white grounds. If the reader will investigate for himself he will find that—

1. Black ink upon red appears dark green.
2. Black ink upon orange appears bluish black.
3. Black ink upon yellow appears black with a violet hue.
4. Black ink upon blue appears orange grey.
5. Black ink upon green appears reddish grey.
6. Black ink upon violet appears greenish grey.

These may be verified by means of strips of tinted paper to represent lines, or by placing one piece of coloured paper upon another.

The printer, however, may not only use coloured paper for printing with black letters, but ground or "tint blocks." In these certain lines or patterns are sometimes formed,

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and enable very brilliant effects to be produced. The admixture of white always heightens the tone of the neighbouring colours, and renders them more brilliant. A great advance was made in colour printing when the system of forming letters in these blocks was introduced—that is, of leaving spaces corresponding to the shapes of the letters. By using the types which are intended to accompany the blocks, effects previously unattainable in typography were achieved.

Carrying out the principles of complementary harmony already referred to, we get the following table of *preferential colours*:—

Red and yellow may be used together, not red and orange.				
Red and blue	,,	,,	,,	red and violet.
Yellow and red	,,	,,	,,	yellow and orange.
Yellow and blue	,,	,,	,,	yellow and green.
Blue and red	,,	,,	,,	blue and violet.
Blue and yellow	,,	,,	,,	blue and green.

The complementary arrangement of colour is—if printers would only acknowledge it—superior to every other. The preceding list will be found to indicate almost infallibly the best combinations for display and richness of colour. To attain this effect in all its brilliancy, however, the tones should be as nearly as possible of *the same depth*, but this may be easily secured by the use of the pigments to be given in the next chapter, in conjunction with the modifying agencies therein referred to.

In regard to the *contrast* of simple with secondary or compound colours, the following will be found to be practically useful, although it would be well were the student to work out the matter for himself:—

Red and violet accord better than blue and violet.

Yellow and orange accord better than red and orange.

Yellow and green accord better than blue and green.

The red, yellow, and blue should in these instances be of a lower tone than the secondary colours, violet, orange, and green.

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These principles also enable us to lay down certain negative rules of the greatest importance to the printer. It has already been shown how two complementary colours when mixed give black. To avoid this result we must *never* print—

Red upon green paper or ground.
Green upon deep rose paper or ground.
Yellow ,, violet ,, ,,
Violet ,, yellow ,, ,,
Orange ,, blue ,, ,,
Blue ,, orange ,, ,,

The student of colour printing would do well to get a block, type-high, made of some hard, close-grained wood—say a boxwood block, such as is used by engravers. He should pull it in black on various coloured papers, to verify the preceding rules. He should then pull it in various coloured inks on white paper. Let him preserve these rough impressions, as they form useful memoranda for future reference, and practical illustrations of these optical principles.

To make the fullest use of these impressions he should then print on them various letters; but for convenience sake a camel's hair pencil and water-colours may be used instead of ordinary inks. Among other things he will find that black never produces a bad effect when associated with two luminous colours. When two colours accord badly, a black line will frequently restore the harmony, particularly if there is plenty of white between. The removal of the lines so as to leave a greater white space will generally restore the harmony.

Proceeding with the lessons to be learned from this ground-block, we may arrive at the following conclusions:—

Deep Red ground (or vermilion). Yellows are brightened, red lines between become deeper. Blue ink on this ground will be lower in tone than upon black, and will assume a greenish tint. Orange increases in brilliancy. Red, however, should not be used as a ground for gilt letters unless

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its tone approaches that of chocolate or "maroon." This latter colour is made by mixing red and black. The effect of a dark red-brown block printed on orange paper* is very remarkable. Blue or violet letters form a goood contrast on orange grounds.

Yellow.—This colour may be got by using gold, bronze ink, or the ordinary yellow ink. If the ground is yellow, of course gold must not be employed. Blue (which accords so well with silver) takes a violet hue on a gilt or yellow ground. Greens appear bluer and more pure; pinks and reds come out well. Violet is very pretty on a gold ground.

Green.—This ground is often used with gold, and has an excellent effect. A golden yellow line appears darker than on either white or black, and is much less brilliant than on a dark red ground. Blue looks dull on a green ground. Green, of a darker or lighter shade, looks subdued, but has an excellent effect. Red, pink, mauve, or violet, all look well and brilliant. Yellow shaded or relieved with red has a peculiarly brilliant effect.

Blue.—Gold or yellow becomes more brilliant—the gold making the blue appear deeper. Yellow becomes intensified, as it becomes the complementary. Green becomes lighter and more yellow. Rose, lilac, and pink colours should not be used; they appear quite dead.

Violet.—Blue becomes greenish, green more yellow.† Green, if of a yellow tone, becomes more brilliant, like orange. Bright metal gold shows up well.

Red-Brown.—On this ground all positive or primary colours stand out brilliantly.

Black.—Blue is lower by at least two tones; yellows appear redder; orange is finer and more brilliant; green is lighter; but rose-colour and violet are well brought out. ‡

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* This paper is avoided by the printer on account of its party associations but it is capable of very startling effects. It is made by coating common paper with red lead. Old newspapers and printed matter may be used up in this way. The use of orange ink will be referred to hereafter.

† The mauve inks should only be used as self-tints on white, or in connection with green lines on a white ground.

‡ The remarkable effects obtainable from a black ground may be studied in the valentines and complimentary cards thus printed.

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These experiments will suggest a more frequent use of ground-blocks in printing; but the white and letters should be similar to those the printer has in his office. Indeed, it is an easy matter to pull an impression of a line and then trace it on to a block in the same manner as was described for cutting odd wooden letters.

Fugitive Colours.—Unless the work in hand is of a very ephemeral character, such as a placard for some approaching meeting—a production which will be done with in a few days, the printer should pay attention to the permanence or the fugitiveness of his colours.

All colours change in time, but while some are merely varied, others are deepened, and others are destroyed altogether. The following lists contain the names of the most generally used pigments, arranged in classes, according to their relative degrees of permanence:—

Fugitive Colours.

Yellow.—Yellow lake, Dutch, English, and Italian pink, yellow orpiment, king's yellow, gamboge, gall-stone, Indian yellow, queen's yellow, and patent yellow.

Red.—Rose pink, carmine, Florence, Hambro', and kermes lake, rouge, iodine scarlet, and dragon's blood.

Blue.—Indigo, intense blue, Antwerp blue, Prussian royal.

Orange.—Orpiment, golden sulphur of antimony, annata.

Green.—Sap, verdigris.

Purple.—Lake, burnt carmine, lac lake.

Brown.—Pink, light bone brown, prussiate of copper.

Several of the above are in high repute for printing, yet they are very evanescent, becoming both lighter and duller by exposure.

Permanent Colours.

White.—Common white lead, flake, crems, Venetian, barytic, tin, blanc d'argent.

Yellow.—Terra di Sienna, jaune, chrome, Naples, yellow ochres, lemon, Oxford, Roman cadmium.

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Red.—Lac lake, red lead, chrome, vermilion, madder lakes, madder carmines, light red, Venetian, Indian, scarlet.

Black.—Ivory, lamp, Frankfort, mineral, blue-black, black chalk.

Blue.—Verditer, sanders, cobalt, ultramarine, blue ochre, smalt.

Orange.—Lead, chrome, vermilion, ochres, jaune de mars, burnt sienna earth, burnt Roman ochre.

Green.—Emerald, verditer, common chrome, mineral, terre verte, cobalt.

Purple.—Gold, madder, purple ochre.

Brown.—Vandyke, Rubens, raw umber, burnt umber, marone lake, Antwerp, asphultum, sepia, manganese brown, bistre, Cassel earth.

A knowledge of the preceding abstract rules, and their practical applications, is not only highly useful to the printer, but constitutes a means of constant pleasure in devising new combinations. They do not involve much application to learn by heart, and the means of verifying them are within the reach of all, consisting of a few cakes of water-colours and strips of coloured paper.

It would be well, before commencing every large job, such as a placard, to take a sheet of paper of the size and colour that is intended to be printed, and to arrange on it different coloured strips of paper corresponding to the lines when printed. In the choice of these colours the rules preceding should be conformed to, and then no fear need be entertained of the result being repugnant to the most educated eye.

The next point to be considered is, how to get the precise colours which, by experiment, have been found to be most suitable; and this will form the subject of the next chapter.

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CHAPTER XIX.

COLOUR PRINTING—Manufacture of the Inks—Varnishes—Dryers, &c.

ALTHOUGH nearly every kind of coloured ink is now manufactured on a large scale by those who devote their entire attention and a special plant to the matter, and the printer may obtain from such firms nearly all the ink he requires, at a lower price, and perhaps of a better quality, than if he made it for himself, we yet think it desirable to give our readers some practical instructions on the processes of coloured ink making—partly in order that, on an emergency, they may be independent of external aid, and partly because those who know how a thing is made generally have a more intelligent idea how it ought to be used.

Materials Required.—The printer provides himself with the following—a marble slab, about an inch and a half square; a muller, of marble or stone; and a palette knife. The materials required for making the inks are—(1) the varnish; (2) the colours, or "dry colours," as they are called. They must not be confused with "dusting" colours, however.

Dry Colours are those intended to be mixed with varnish, and the ink thus prepared is used like ordinary black ink.

Dusting Colours are in powder. The forme is printed in an invisible or "white" varnish, and these colours are dusted over it with a broad hair-brush, a clean hare's foot, or a little wool. The colours adhere to the paper only where it is coated with varnish, and when the latter is well dried the superfluous powder is brushed off.

We will describe the use of dry colours first. The raw colours may be purchased from the drysalters or oilmen. Several of the printing material dealers, however, supply colours especially prepared for printers' use. They ought to be of the best quality. The "printers' varnish" * may be had from the ink-makers.

* Common painters' varnish is unsuitable for printing, but it may be used on an emergency if a quarter of a pound of soft soap be added to every pound of colour.

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Coloured inks should always be mixed on a slate or marble slab, with a stone or glass muller, and never upon an iron or other metallic table. This slab must, before beginning to mix, be thoroughly clean, and perfectly free from the slightest soil or trace of other inks.

No more ink should be mixed at a time than is required for the job in hand.

The colours are generally in various-sized lumps, which must be well ground on the slab by the use of the muller. Even the powder received from the oilman must be carefully ground in this way. Everything depends upon the grinding. If the smallest lumps are left, they will spoil the ink, clog the type, change the colour, and destroy the appearance of the job.

Small colour-grinding mills are now manufactured at a low cost, which will be found very useful and economical by the printer who has frequently to make up coloured ink, but the muller and slab will be quite sufficient for all practical purposes if patience is used, and cleanliness observed, and the grinding done thoroughly.

Next, mix up the colour with the varnish, by using the palette-knife. The requisite consistency is attained by gradually adding more powder. The same rules that apply to black ink are applicable to coloured ink in this respect. A large, heavy job, such as a placard, will require thin ink, while a card or wood engraving will require a thick ink. The quantity of varnish used, of course, determines the consistency of the ink.

Some of the tints which are exceedingly light require an admixture of some white powder to make the ink thick enough for printing the required job. Whiting is suitable for thin colours, and dry flake white for the heavier ones. Either must be added in the process of mixing.

If two colours are to be mixed together, the darker tint should be first mixed with the varnish, and the lighter one added, in small quantities, gradually. Thus, if the colour be a dark green, the blue should be mixed up first, and the yellow added; but if it be a very light green, then the yellow should be first applied, and the blue added afterwards.

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The best method of mixing cannot be very clearly described in words, but will soon be found out after a little practice. The material should be scraped into a corner of the slab, and a very small portion of it spread with the palette knife, and well ground with the muller, until no specks or lumps appear. This portion should then be scraped up and placed in another corner. White lead especially requires this treatment, as it will be found that every little lump when crushed will produce a white streak upon the slab.

Lumps of any kind, in any sort of ink, not only clog the type, but alter the tint; hence they must be very carefully avoided. The aim of the grinder should be to get a quite impalpable powder.

When the mixture is complete, it ought to be brayed out with the muller, and not with the ordinary brayer,* as any remains of black ink that might be upon it would spoil the ink colour.

We will now enumerate the different colours and the inks which may be made from them, pointing out the special recommendations or defects of the several substances:

For *Red.*—Orange lead, vermilion, burnt sienna, Venetian red, Indian red, lake vermilion, orange mineral, rose pink, and red lead.

Yellow.—Yellow ochre, gamboge, and chromate of lead.

Blue.—Cobalt, Prussian blue, indigo, Antwerp blue, Chinese blue, French ultramarine, and German ultramarine.

Green.—Verdigris, green verditer, and mixtures of blue and yellow.

Purple.—A mixture of those used for red and blue.

Deep Brown.—Burnt umber, with a little scarlet lake.

Pale Brown.—Burnt sienna; a rich shade is obtained by using a little scarlet lake.

Lilac.—Cobalt blue, with a little carmine added.

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* We may here remark that for working coloured inks the roller should not be too hard, and should possess a good "lug." When a roller is required to be used for another colour, it must be carefully cleaned with turpentine, and a moist sponge afterwards passed over its face to remove the turpentine. It must be kept until it is thoroughly dry before being used. The ink must be well distributed, and the forme rolled with extra care.

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Pale Lilac.—Carmine, with a little cobalt blue.

Amber.—Pale chrome, with a little carmine.

Pink.—Carmine or crimson lake.

Shades and Tints.—A bright red is best got from pale vermilion, with a little carmine added; dark vermilion, when mixed with the varnish, produces a dull colour. Orange lead and vermilion ground together also produce a very bright tint, and one that is more permanent than an entire vermilion colour. The pigments are dear; when a cheap job is in hand, orange mineral, rose pink, and red lead may be used.

Yellow.—Of the materials named, the chromate of lead makes the brightest colour. If a dull yellow be wanted, yellow ochre may be used; it grinds easily, and is very cheap.

Blue.—Indigo is excessively dark, and requires a good deal of trouble to lighten it. It makes a fine showy colour where brightness is not required. Prussian blue is useful, but it must be thoroughly ground. It dries very quickly, hence the roller must be frequently cleaned. Antwerp blue is very light, and easily worked. Chinese blue is also available. As already said, the shade may be varied with flake white. There is this objection to Prussian, Antwerp, and Chinese blues, that they are hard to grind, and likely to turn greenish with the varnish when used thin. A bright blue is also to be got from cobalt, or French or German ultramarine. This is cheap, easily ground, and works freely. Lime blue may also be used.

Green.—Any of the yellows and blues may be mixed. Gamboge, a transparent colour, is very useful in mixture with Prussian blue; or chromate of lead and Prussian blue may be used. The varnish, having a yellow tinge, has an effect upon the mixture, and should be taken into account. With a slight quantity of Antwerp blue, varnish in itself will produce a decidedly greenish tint. Verdigris and green verditer also give greens. If Chinese blue be added to pale chrome, it gives a good green, and any shade can be obtained by increasing or diminishing either colour. *Emerald* green is got by mixing pale chrome with a little Chinese blue, and then adding the emerald until the tint is satisfactory.

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Brown.—Sepia gives a nice tint, and burnt umber a very hot tint. Raw umber gives a brighter brown, bistre a brighter still.

Neutral tints are obtained by mixing Prussian blue, lake, and gamboge.

In using painters' colours, it is advisable to avoid as much as possible the heavy ones.

Pink.—Carmine or crimson lake gives a good, bright pink.

Scarlet.—Carmine with a little deep vermilion gives a very deep colour.

Black Ink without Oil or Resin.—Savage ("On the Preparation of Printing Ink, both black and coloured;" London: 8vo., 1832—a most valuable, but now very rare work) gives the following recipe for an ink which, he says, will be found of importance to every master printer who executes fine work or highly finished engravings on wood, as he may prepare it himself without the least risk, and with no more trouble than would be equal to grinding a little oil paint, and thus keep a small quantity in a tin can ready for use at any time; or in case of emergency it can be prepared in half an hour. The object of dispensing with the oil and resin is to get clear of the imperfections of inferior or adulterated oil; of over-boiling or under-boiling; of inaccurate proportions of resin, and the trouble and danger of boiling the oil.

	oz.
Balsam of Capivi	9
Lampblack	3
Indigo or Prussian Blue, or equal quantities of both	1¼
Indian Red	¾
Turpentine Soap, dry	3
	17

Will make one pound of ink. Grind the ingredients upon a stone, with a muller, to an impalpable fineness, and the ink will be ready for use.

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General Hints on Making Coloured Inks.—The following is a recipe for making varnish: Four ounces of boiled linseed oil, and six ounces of yellow resin; or four ounces of neat's foot oil, and six ounces of yellow resin. Mix in a small earthenware pipkin over a slow fire. The varnish is ready for use when cold. Care must be taken that it does not boil over. The materials must be of the best quality, otherwise the varnish will be a failure. Clear resin is, perhaps, preferable. Let the oil stand until all the floating particles of fat have settled at the bottom and top of it. A small quantity of litharge expedites this process.

The printer must constantly bear in mind that some colours require less oil in the varnish than others, or he may make ink that will be practically useless.

Light-weighing colours, such as Chinese, Prussian, and Antwerp blues, chromes, patent yellow, rose pink, emerald green, and Brunswick green, suit such jobs as broadsides best when there is little of the resin in them.

Red, for most purposes, is certainly best bought from the ink-makers; but for the finer kinds, especially tints required to show up other tints, it is best when made up by the printer, as wanted.

For fine work, a little Canada balsam of the consistency of honey makes a good varnish, of great purity. The coarser but similar Venice turpentine may also be used with effect when time is precious and purity of tint not indispensable. A little soft soap may be added to the Venice turpentine.

If the work be coarse, and varnish not at hand, a little oak varnish and soft soap form a good substitute.

Savage gives as ingredients for varnish, balsam of copaiba and Castile soap. It is an excellent mixture, and works clear, if well ground, but is most objectionable on account of its smell.

"Fine printers' varnish" is nearly the same as the burnt linseed oil used by ink manufacturers; hence the latter may be used instead of varnish. The oil may be burnt and boiled in the open air, and the addition of a little resin is no detriment.

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Prussian and Chinese blue, which are only variations of the same material, form excellent tints to work in contrast with or on vermilion, where it looks black. Covers of magazines are sometimes done in this way with only two colours, yet a variety of tints are obtained.

Vermilion, being a very dear colour, is often adulterated, and there are numerous substances passed off for it.

Red lead is a heavy colour, of a light orange tint, and is very difficult to work, even on the commonest paper.

Venetian and Indian reds are really reddish brown on paper.

Good rose pink is a cheap substitute for the crimson and scarlet lakes, which, however, should be used for good work. It may be lightened with any good light red, which will give it body.

Patent yellow is the cheapest material for yellow ink. Its tint may be heightened by a little orange chrome or a little vermilion. It forms a good foundation for green ink when mixed with Prussian or Chinese blue.

The Brunswick greens, of three shades, are very useful for making green ink, and comparatively cheap.

Brown ink is really red and black. Burnt umber, Spanish brown, and vandyke brown are useful, but the last is hard to grind.

Purple and mauve inks are better bought than made.

Where colour is very hard to grind with varnish on a muller and slab, it may be first ground with turpentine and then mixed with the varnish. The turpentine quickly evaporates, and leaves the colour thoroughly mixed and ready to work.

Common qualities of coloured inks may be brightened by using the whites of fresh eggs, but they must be applied a little at a time, as they dry very hard, and are apt to take away the suction of rollers if used for any lengthened period.

A hardening gloss for inks may be made by dissolving gum arabic in alcohol or a weak solution of oxalic acid.

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This mixture should be used in small quantities, and mixed with the ink while it is being consumed.

A bronze of changeable hue may be given to inks with the following mixture: Gum shellac, 1½lb., dissolved in one gallon of 95 per cent. alcohol or Cologne spirits for 24 hours. Then add 14 ounces aniline red. Let it stand for a few hours longer, when it will be ready for use. When added to a good blue, black, or other dark inks, it gives them a rich hue. The quantity used must be very carefully apportioned.

In mixing the materials, add the dark colour sparingly at first, for it is easier to add more, if necessary, than to take away, as in making a dark colour lighter you increase its bulk considerably.

If a colour when worked does not look as full as you could wish, dust it over while wet with its own dry colour, which will wonderfully intensify it, using cotton wool or a camel's hair brush for the purpose, just as you would in bronzing.

If it is necessary to keep coloured inks, the best way of preserving them, so that they shall be workable after standing some time, is to pour a little colza oil on the top and securely close the vessel containing them. This oil will not generally rob the ink of any of its colour, and even if it is not all poured off afterwards, its presence can do no great harm. Some colours will not keep at all, and others deposit at the bottom of the can almost all their solid ingredients. It is not easy to alter this, but colza oil will at least prevent the surface skinning over.

Red and some other coloured inks are often found to become so hard in a few weeks after the can has been opened that the knife can scarcely be got into them, and they cannot be got to work at all. Oil, varnish, and turpentine are of no use in such a case; the remedy is paraffin oil mixed well up with the old ink. Indeed, many prefer paraffin oil rather than boiled oil or turps for thinning down both black and coloured inks.

Benzine is a powerful chemical preparation, which may be used to remove coloured inks when lye and turpentine

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fail. It should, however, not be used after dark, as it is very inflammable, and it should be kept out of doors if possible.

When ink is put out for a job, the pressman must consider not only whether it is the right shade, but whether it is too stiff or heavy, or too thin, and liable to spread on the impression. Every office should be provided with at least two kinds of varnish, as well as boiled oil, thick and thin. If the ink, from the effects of cold or any other cause, is too heavy to distribute freely, add the varnish or oil—the varnish for fine, the oil for ordinary work—in small quantities, and mix well until the ink is reduced to a proper consistency for distribution, without making it so thin as to deaden the colour or cause it to spread.

If a thin, cheap ink is being used, and it is found to be too thin for the work in hand, a small quantity of a better quality of ink should be mixed with it, to give the necessary body to produce a clean impression.

Besides the two questions named above, the pressman must also consider whether his ink will dry fast enough, or will dry too fast. Every printer should have a good drying preparation. In using it, the pressman must exercise his judgment in regard to the extent to which the ink should be mixed with it, as no rule can be given to suit all contingencies which may arise where such dryers are necessary. The following are recipes for dryers:—

No. 1.—*For Fine Job Work:* Damar varnish, 6 ounces; bergamot, 2 drachms; balsam copaiba, 2 drachms; balsam of fir, 3 ounces; creosote, 1 drachm; copal varnish, 1 drachm. Where an extra quick dryer is desired, add a few drops of dissolved gum arabic to the ink after it has been mixed with the dryer. In all cases mix well with the ink before applying to the rollers.

No. 2.—*For News and Poster Ink:* Spirits of turpentine, 1 quart; balsam copaiba, 6 ounces. Add a sufficient quantity to the ink to thin it to a proper consistency for working. This compound is one of the best that can be used as a dryer, and to brighten coloured inks and make them work free.

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No. 3.—*A Quick Dryer:* Japanese gold size, 2 parts; copal varnish, 1 part; elder powder (radix carlinæ, carline thistle), 2 parts. Incorporate well together with a small spatula, and use in quantities to suit the consistency of the ink employed and the rapidity with which it is desired to dry. The usual proportion is a small teaspoonful of the dryer to about an ounce of average good ink.

CHAPTER XX.

THE METHOD OF COLOUR PRINTING—Making up the Formes—Lithographic ground tints—Register—Points—Hints on the Inks—Cautions, &c.

COLOUR printing by the typographic process is done exactly in the same manner as plain printing in black. The forme is rolled and pulled in the ordinary way, and the mode of making ready, laying on the sheet, and taking off is in no way dissimilar.

It is obvious, however, that the difficulty in this kind of work consists in the inking of the forme with the several colours. The latter must be applied only to the particular lines which are to receive them, and all other portions of the forme must be carefully guarded against being coated with the ink. The common roller, as an inking instrument, is the most unsuitable that could be devised, and its chief recommendation for ordinary one-colour work, the ease with which it can be drawn along the entire face of the forme, is its chief disqualification when the ink has to be deposited locally and in patches.

There are several methods of obviating this difficulty, and they have been described in Part I., Chapter XVIII.

The method of skeletonising forms is followed in working the machines which print in two colours at one operation. They have two tables, two sets of rollers, and two sets of apparatus for inking. The two formes are laid on the tables at each end of the machine, and rollers of one colour

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only come near them. Tapes or grippers, as the case may be, convey the sheets from the one forme-table to the other.

Lithography is very advantageously employed in conjunction with typography for colour printing, especially in working the ground tints. The latter would frequently, if printed on the letterpress, take a very long time to dry; but by doing it in lithography a clean, even tint may be obtained, which is dry almost as soon as it leaves the press.

There is great scope for the exercise of ingenuity in colour printing, and the intelligent workman is always able to effect new combinations and produce novel effects.

If solid ground-tint blocks of a light colour are used, words printed on them in a darker colour have the same effect as a two-colour line.

A shaded line—black and red, for example—may easily be produced with ordinary types. On a bright red ground tint print the first line in bright red, and then by printing the same letters in black laid slightly to the left of the red ones, as though falling on them, a black letter with a red shade on a light green ground tint may be produced.

Indeed, a good effect is often to be obtained by printing the lightest colour first from type a little larger than that used in the second working, which can then be laid so as to fall in the centre and leave the lighter or ground colour to show up all round the type worked last. Each colour should be allowed time to dry, and quick-drying inks be used.

Plates for Block Printing.—It is necessary that these should be made with great accuracy, and this is a serious drawback to most work of this kind, for mathematical exactitude is necessary, and the word almost must be banished from the mind of the operator. Wood is subject to the atmospheric changes; a storm or sudden alteration in temperature, the dampness or dryness of the printing-office, all affect the wood, and sometimes to a very considerable degree. A storm, followed by a sudden cooling of the atmosphere, may cause such an expansion in a single night that the work already completed will not agree with

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that which is to follow; and we have known cases in which it has taken days of laborious experiments, by exposing the blocks to different degrees of temperature, to reduce them to their original dimensions.

It is better therefore to use plates in metal, and to make a stereotype from the original engraving to serve as a base for the blocks from which the colours are to be printed.

Paper can be used either sized or unsized, although the latter is preferable. In order to obtain good results, especially when the surfaces are large, the paper may be carefully smoothed upon a roller, and with plates of zinc, or calendered in the ordinary way. The impressions should always be dry, for the dampness destroys the brilliancy obtained by the glazing, and also causes shrinking.

It is, perhaps, unnecessary to add that the paper should be of good quality, equal in surface and perfect in colour—any defect in this respect neutralising the care taken in the impression.

Register.—This is the cornerstone upon which must rest all printing in colours, and it is this which gives typography an advantage over lithography. Thus the typographic impression is made by a stroke, dry and straight, while that by lithography is generally executed by the friction of the scraper, which stretches the paper more or less considerably, in proportion to its thickness and consistency.

To preserve this superiority, exactitude of register is one of the most important means, and numerous processes have been attempted, one of the best of which is to preserve for each impression a pair of special points.

Successive impressions seem essential to good work, the simultaneous impressions always leaving something to be desired. It is impossible to make the plates so perfect that no point of junction is visible, and in the next place this kind of impression requires as much time for the double or treble inking and the fitting together as is required for two or three successive impressions.

Colour printing is most perfectly done on the hand press, for the reason that machines, by their own vibration, tend to prevent perfect register.

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Points.—The points used for fine colour work are different to those for common single-colour work. They are made of small pieces of thin sheet iron, each about $1\frac{1}{2}$ in. long and $\frac{1}{3}$ in. broad. To each of them are riveted three or four spurs, for working the colours in true register, and in each there are three holes for tacking them to the forme. The length of these spurs is such as to make them just or hardly as high as the surface of the type, and one set thus riveted forms a series. To the furniture of the first coloured forme only, two series of these points are tacked, one at the top and the other at the bottom of the forme, to fall at the extremity of the margin. Thus fixed, the tympan will fall upon the spurs and perforate the paper in the same direction as the impression is received from the forme. These perforations are the point-holes, by which each successive colour is made to fall, one after the other, in its proper place. The top series of these point-holes is represented thus . . . .

For the second colour a pair of ordinary points is fixed to the tympan, and the first point-hole in each series is used to make this colour fall in register with the first. The second point-hole in each series is then employed to make the third colour fall, and so on with all the colours that are to be worked.

By this method a fresh pair of point-holes is reserved and used for each colour, and an excellence of register obtained which cannot be improved. After all the colours are thus worked, these point-holes are cut off the margin, and the work finished.

With the aid of a mitring machine and a few lengths of metal rules a great variety of borders may be obtained. An octagonal border may be locked in a circle. After one colour is printed it may be merely turned just one-eighth of a revolution, and again printed with another colour, thus producing a pretty and novel effect.

Instead of ground-blocks, a tint produced by putting together a number of pieces of border may be used with excellent effect. The border should be as new as possible, and not battered in any part, or it will not throw out the printing afterwards done upon it.

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Hints and Cautions.—Reference has already been made to the importance of the quality of the paper used in colour printing. Indeed, in printing in black the paper has a greater influence for good or evil than is commonly supposed. The ink should always be adapted to the paper. A brown tint in paper makes the ink look brown, and this fact should be taken into consideration and provided for.*

Attention should also be paid to whether the paper is porous or glazed. If you press your tongue against it when porous it will immediately get soft from absorbing the moisture, and become semi-transparent. Porous paper is of course less transparent, and with a strong ink is more apt to be torn; it requires therefore thinner ink, and is generally printed from in a damp state, less ink being required.

Soft paper generally contains clay, sometimes as much as 30 to 40 per cent., which makes it brittle, and the powder is apt to fall off, and make fluff on the machine, ink-table, and rollers. The ink is then often accused of being unground, from the fluff sticking to it, and making it look rough and sandy.

Soft or engine-sized paper, from its absorbent nature, takes up ink rapidly, as in newspaper printing, where the impression is intended for immediate sale. In the case of tub-sized paper, which resists the action of the tongue, before mentioned, dryer inks, specially prepared, require to be used, in order not to set off, as the ink is not absorbed and must therefore form a skin. Dryer inks, properly so called, require to be cleared up from type, tables, and rollers each time the press stands, as the skin is apt to form, which may then either tear the rollers or come off in little pellets, filling up the type. This explains how some inks are said to dry on the paper and not elsewhere.

Clay in paper is detected by burning a portion of it and noticing the quantity and quality of the ash. In paper so adulterated, the white ash nearly equals in bulk the original paper.

* Several of the above hints are taken from "Special Instructions to Agents" of Messrs. Fleming and Co., the eminent ink manufacturers, of Leith.

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All ink, when opened, especially the thick and dryer inks, should be lifted from the top, keeping the surface as smooth as possible, otherwise the side portions will skin, and this mixing with the rest of the ink is apt to spoil the whole. All cans should be kept covered from the atmosphere, and all scrapings from table and boxes kept separate, for poster or coarse work. If water gets mixed with ink it will make it roll out badly, and work specky. Any skin formed should always be carefully removed, to prevent its mixing with the undried ink.

Red inks made from vermilion cannot be used upon electro-plates of copper, on account of the formation of an amalgam and a sulphur, which destroys the brightness of the colour and eats away the block. The system of brass-facing casts is now adopted to obviate this evil, brass being unaffected by the substance of the ink; nickel facing has also been successfully introduced with the same object.

CHAPTER XXI.

PRINTING IN GOLD, by Bronze Powders, Gold Leaf, and Dutch Metal —Flock or Velvet Printing—Gelatining.

PRINTING in gold is very much more extensively practised in the present day than formerly, and has, in fact, become a regular adjunct of colour printing. It is not necessarily either a very difficult or a very expensive process, yet many ordinary pressmen cannot perform it with any degree of success.

This kind of work may be done in three ways:—

1. By using bronze powders.
2. By using gold leaf.
3. By using Dutch metal.

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In regard to bronze powders, there is a variety of colours to be had, which are classified thus:—

Patent bronze powders, pale, deep, extra deep, and red gold; citron, orange, flesh, copper, orange copper, scarlet, crimson, purple, and green; white and silver composition.

Hand-made bronzes: citron, orange, pale and deep gold; pale scarlet and crimson, brilliant pale and deep.

The prices of these powders vary according to the colours, ranging from 7s. 6d. to 50s. per pound. We would caution the printer, however, that no saving is effected by using the coarser kinds, as only the finer grains adhere to the impression—all the rest has to be thrown away. Very smooth and fine powders have a tendency to blacken the paper unless it is enamelled. Such powders, too, are not as brilliant as the coarser qualities. Hence, while fine powders are selected for the sake of economy, rougher and brighter kinds are used when the job will permit of the extra expense.

The silver bronzes are of two kinds. One is made from real silver, and the other from white metal. The latter is bright when printed, but soon turns black.

As a matter of course, gold and silver dust may be used instead of the bronze, though the latter will be found good enough for all ordinary purposes, as that kind of work is but of rare occurrence which would warrant so large an outlay as the use of either of the former would entail.

Gold leaf is called red finishing, extra deep, regular deep, lemon pale, white. There is also silver leaf in several descriptions, as well as aluminium leaf (chiefly for book-binders).

Gold leaf is made in the following manner: The gold to be beaten into leaves or layers is prepared by melting in a plumbago crucible, and then cast into ingots, forged, and passed between rollers until it assumes the shape of a long ribbon, and is as thin as ordinary writing-paper. Each of these ribbons is cut into a number of small pieces, and forged upon the anvil. These small square pieces weigh

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about 6 $\frac{3}{10}$ths grains each, and are about the 760th part of an inch thick. They are next annealed, and interleaved with vellum about 4 in. square. About twenty vellum leaves are placed on the outside; the whole is then placed in a case of parchment, over which is drawn another similar case, so as to keep the packet tight and close on all sides. It is next laid on a smooth block of marble or metal, and the workman begins beating with a round-faced hammer weighing 16lb. The packet is turned over occasionally, and the beating continued until the gold is extended to nearly the size of the vellum leaves. The packet is then taken to pieces, and each piece of gold is divided into four, with a steel knife having a smooth but not very acute edge. These pieces are next interlaid with pieces of animal membrane, from the intestines of the ox, of the same dimensions and in the same manner as the vellum. The beating is continued, but with a hammer weighing only 12lb., till the gold is brought to the dimensions of the interleaved membrane. It is now again divided into four by means of a piece of cane, brought to a fine edge, the leaves being by this time so thin that any accidental moisture condensing on an iron blade would cause them to adhere to it. The leaves are next divided into three equal portions, and interleaved with membrane as before, and beaten with the finishing hammer, weighing only 10lbs. The packets are now taken to pieces with the aid of a cane instrument and the breath, are placed flat on a leather cushion, and cut into squares one by one, by a small square frame of cane made the exact size, and are lastly laid in books of twenty-five leaves each, the paper of which is first smoothed and rubbed with red chalk to prevent the leaves adhering. By the weight and measure of the best gold leaf it is found that one grain can be made to cover 56$\frac{3}{4}$ square inches, and from the specific gravity of the metal, together with the admeasurement, it follows that the leaf itself is a 282,000th of an inch thick.

Dutch Metal is merely an imitation of the real gold leaf, and used as a cheap substitute for it. It is sold in bundles of 2,500 leaves each, at from 3s. to 5s. per bundle; but there are various qualities. No. 1 is the lowest grade, and

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No. 4 the best. The two higher qualities are the most useful for printing purposes.

Having described the materials for this description of work, we may explain how they are used. One general principle is applicable to the three kinds of metal. An impression of the forme must first be taken in adhesive varnish, and then the bronze, metal, or leaf must be applied. It is, therefore, a question of great importance to the gold printer how to secure an effective preparation of adhesive media for the materials with which he is working.

Any adhesive varnish which may be used for gold printing is called in the trade "gold preparation." Compounds of this kind may be made with or without body. They may consist of the adhesive medium pure and simple, such as melted gum, or long varnish and gold size, or this adhesive varnish may, for the purpose of increasing its strength, be modified by the addition of body colour, such as burnt umber, burnt sienna, or chrome. Where it is possible to use the adhesive varnish alone, without the addition of body colour, it is best to do so. The primary qualification which a good gold preparation ought to possess should be a capacity for sticking. It should also work clean, as it is not the varnish or gold size in a gold preparation which fills up the forme and clogs the type, but the pigment mixed up with the varnish: the pigment or body should be avoided where possible. The paper used has much to do with the selection. A preparation without body may be admirably suited for printing on hard papers, while for softer paper it will sometimes sink into the fabric like water in a porous stone, leaving after awhile the bronze in a dry powder, which may be readily wiped from the surface of the sheet.

The object, then, is to get a material which shall possess the necessary density and toughness, combined with adhesiveness—one that is too thick to soak into the paper, and yet has a drying property sufficient to fix the metal or the dust.

The following are receipts for gold preparations:—

For printing on ordinary unenamelled printing paper, grind one ounce of burnt umber, or burnt sienna, in two

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ounces of extra strong varnish—technically known as "long varnish" on account of its elastic properties— and add one ounce of gold size.

For a hard-sized enamel surface, the long varnish and gold size alone may be used; but this cannot be adopted with safety for soft enamels.

For extremely soft papers, which require a preparation of extraordinary strength, long varnish may be ground in the very dense primitive chrome manufactured by Cory and Co., which stands up and dries glossy on the surface like gloss red.

Out of these preparations, the most suitable one for the job in hand must be selected. The pressman may be reminded that the compounds of burnt sienna and umber are pigments that dry up very rapidly, and soon cause the roller to lose its tackiness and freshness; hence frequent washing up is necessary.

The impression in gold preparation must now be sprinkled with the powder. This may be done in various ways. A tuft of cotton is often used. Some printers employ a hare's foot with the hair on, which is an instrument preferable to brushes and pencils, as it requires less bronze. The bronze, being really only copper reduced to an impalpable powder, is very injurious to those who work in it, and serious diseases will often result unless all possible precautions are taken to prevent the operator from inhaling the atoms which are dispersed through the air. In order to avoid these consequences, it is well to use frames about a yard square, with glass above and at the sides, so as to permit the workman to see his work. On the front face a longitudinal opening can be made, to allow the introduction of the sheet of paper and the arms of the operator. A bandage can also be worn across the mouth; and with such precautions workmen have followed the employment for years without suffering the least inconvenience.

In printing bronze work it is best to have a zinc or wooden tray in which to lay the sheets successively. The smoother the bottom, the more readily and completely the surplus bronze can be wiped up. A sheet of enamelled cardboard

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may be fastened to the bottom of a wooden tray; or, what is better, a sheet of glass of the proper dimensions.

Several excellently-designed bronzing machines have been introduced to the trade during the last few years, and are found to be very desirable acquisitions to a printing office, not only because they obviate the dangers and inconveniences of using loose bronze, but from the fact that they secure a considerable economy in the consumption of the material, and do the work at a higher speed than can be reached by hand. The bronze is contained in a receptacle something like the ink-duct of a printing machine, and is conveyed over the sheet by rollers covered with plush or felt. The sheet is placed on a traversing band and carried into the machine between the rollers, and discharged at the other end. The criterion of a machine of the kind is the completeness with which it works the gold into the impression; if faulty in this respect, the work is better done by hand.

For printing in *Gold Leaf*, the impression is first taken in a very strong preparation, one which seems perfectly flat and smooth on the paper. The substance known as "melted gum" is preferred by some gold printers, but the strongest lake or smooth chrome preparation may be used as a substitute. Others recommend a composition consisting of two parts of varnish of medium strength, one part virgin wax, and one part Venice turpentine. This must be mixed with the desired colour, more especially with one of such shade as may resemble somewhat the colour of the gold, so as to hide any defects which might occur in the laying on of the gold. Light chrome yellow or burnt ochre gives a good and appropriate colour.

The following is the most approved method of laying the gold leaf, as described by Noble in his work on "Colour Printing," already referred to: "Take a piece of cardboard a pica less all round than the size of the leaf to be laid. Cut the edges of this round at the corners; then get a piece of very thick sealing wax, about an inch and a half long, and stick it in the middle of the card. Gently lift the paper off the gold leaf, and place the card, holding it by the wax handle, on the top of the leaf. If the gold be now

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gently blown over the edge of the card the leaf may be raised thereon and deposited in its proper place on the printed sheet."

For gold of fine quality a gilder's palette is useful, which consists of long badger's hairs, fixed between two cards. These hairs should be slightly greased by passing them over one's cheek or head, which will facilitate the removal of the gold leaf from the book to the card or paper, upon which it should then be pressed, by means of a cotton rag.

To separate fine gold, it should be laid on a leather-covered cushion, which has been previously rubbed over with Spanish chalk, and then cut with a fine polished knife specially kept for that purpose.

Generally speaking, the treatment of the fine gold requires a certain amount of dexterity, and it may be as well to notice the mode in which gilders and bookbinders perform similar operations. As for the imitation gold, the whole book may be cut through with a pair of shears. This gold being very cheap, it is not necessary to be as economical in its application as with the finer qualities.

An essential point to the success of the operation is to procure gold leaf as thin as it can possibly be had, having taken care that all the leaves are of the same shade. It often happens, particularly with the cheaper sorts, that some leaves are more or less yellow than others, which has a most damaging effect if used on one and the same object.

For printing with *Dutch metal*, a soft and ductile quality should be selected, and the adhesive material should be strong enough, as the Dutch metal is liable to break away or peel off, especially at the edges of the work. The forme should have a hard impression all over, and the metal should be pressed into the impression with a large piece of cotton, until it adheres to every part of it. This is of prime importance.

After the gold has been thūs applied, the impression should be laid between two sheets of paper, and rubbed over on the outside with the hand. The sheets with the impression contained within them must now be laid on the

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top of the next one, and then both should be brought under pressure, so that the gold may be completely fixed.

It is also a good plan, after the impression is pulled and the metal laid, to place the sheet on a flat board, type high, and lay on the top a soft blanket; then place the board and its sheet and blanket in a press and give a good pull, which will cause the metal to adhere perfectly.

If there is time, the work should be allowed to dry for a few days; if not, it may be rolled immediately, care being taken to give only a very gentle pressure.

In proportion to the coarseness of the gold used, the type with which the job is printed should be large and bold; for this imitation gold does not affix itself easily to fine lines, and if the space between two lines be too narrow, the wool is likely to remove the gold from the finer parts altogether. But if any description of fine gold is used, it may be applied with confidence to the smallest type or the most delicate borders.

Flock or Velvet Printing.—This branch of printing is chiefly used for show cards. It is very simple, yet produces excellent effects.

Flock is finely powdered wool, the darker shades being generally made from old woollen rags, and coloured in every imaginable shade. The colours are very bright, and when worked in combination with coloured inks, bronze, &c., some beautiful effects can be obtained at very slight expense.

This class of printing is best done from engraved blocks showing a dark background, with the letters cut out, but is also adapted to type printing, care being taken to have no small letters in the forme, as the flock sizing, being heavy, and extremely hard to distribute, has a tendency to fill up fine lines or cuts.

If the size, when taken from the can, is too heavy, reduce with Damar varnish, which will thin the body of the size without destroying its adhesive qualities. Prepare the size in small quantities, as it is needed, or it will become dry faster than it can be worked up; and in all cases when a size is being used, be careful to use a roller that has a hard,

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dry face. Never damp the roller just before putting it to the size. The roller should be cleaned at least once an hour during the time it is in use, and always as soon as the job is finished—the best wash for the purpose being spirits of turpentine, finishing up with a sponge damped with clean water. The forme will also be much benefited by an occasional cleaning.

Provide, say, a quarter of a pound each of the following colours of flock: Light blue, light green, crimson or scarlet red, purple, and yellow; a pound of flock sizing; a half-pound of isinglass or frosting; some bronze, and a few ounces each of the following dry powders: ultramarine blue, Paris green, and a good vermilion. All of the above articles, with the exception of the size, may be had from the oil-shops or drysalters, and the size is manufactured by ink-makers. As jobs of this nature are generally done in small numbers, it is best to print them on a press.

After the forme has been prepared, mix the size to suit, roll, and take the impression the same as if for a job to be done in bronze. If bronze is to be used at the foot of the lines, with a camel's-hair brush apply that first, then with the fingers throw on such colour or colours of the flock as may be desired. Take the card into the tips of the fingers, and bounce it until the flock has spread all over the impression, and then shake off the surplus powder into a box, or on a sheet of paper provided for the purpose, and the job is done.

If the frosting is to be used, let it be beaten up as fine as possible: throw it into the impression *before* the flock is used, and shake the surplus powder off. This will show a frosted appearance through the flock, and is very beautiful.

When the dry powder is to be used, it must be applied with a brush the same as the bronze, and when all four of the articles are to be used on the same impression, they should be applied in the following order:—First the bronze, second the dry powder, third the frosting, and last the flock. The surplus powder thrown off can be worked up on an occasional card, to prevent waste.

By a little practice the printer will be enabled, with the

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above directions, to produce some very desirable effects, and can, with very little expense over and above one colour printing, give as many colours as he pleases from one impression.

When flock jobs are done in large quantities, and for such classes of goods as are liable to be roughly handled, the impressions are calendered after the flock has been applied, but for jobs that are to be hung up and not hardly used, it is not necessary.

Gelatining.—Show cards in gold and colours are often improved by being *gelatined*—a very simple operation, which is usually performed in the printer's warehouse.

Procure several tablets of flatted ground glass, cased in wooden frames. A rack should be set up to contain these tablets, which should each have a distinctive number, and an allotted place in the rack. The manipulation of the process should be in a room where little or no dust is made. The framed rack should be built with 3-in. strips of wood, like a drying-rack for gumming envelopes, the back part fastened to a smooth wall, and the under part or bottom covered with pasteboard. The different compartments in the rack must be made exactly level; and it is best to have them levelled with a spirit level, so that the requisite horizontal position of the glass tablets should be exact, without having recourse to packing up. If this is not done the covering of the fluid material will not be altogether equal.

The gelatine itself, which is a white glue obtained from bones, as well as the offal of tanners, is obtained in weak, nearly opaque cakes. The Chinese gelatine, which is obtained in the form of folded tubes, and is of a very white light substance, of vegetable origin, can only be dissolved in boiling water. Ordinary gelatine is thus treated—it is first broken up into small pieces, then put into a clean linen cloth, and suspended (still in the cloth) in a basin of water, which is put in an open crucible, and then submitted to the heat of a spirit lamp, by which the gelatine is dissolved by the boiling water and the impure parts remain in the cloth. The quantity of water and gelatine should give a light, easy fluid, to which then an equal part of spirits of wine is added, as without this addition the fluid poured on

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the glass tablet would soon get cold and spread unequally, while by means of the spirits of wine it levels equally and easily. The most suitable mixture for this is gelatine two parts, water five parts, spirits of wine three parts. But the vessel containing this fluid, after the addition of the spirits of wine, should be covered up, in order that it may not evaporate. It is also necessary that a glass vessel, provided with a measuring scale, such as chemists have, should be used, so that you may be enabled to judge how much of this fluid gelatine is necessary for a tablet in order not to get too weak or too strong a cover. Before the pouring out, the glass tablet should have a slight coating of oil on the surface, to prevent the sticking of the gelatine to the tablet.

The subsequent manipulation consists of the following:— After the requisite quantity of gelatine has been poured into the graduated glass, it is poured on the slightly oiled glass tablet in a semi-warm state, whence it assumes a syrup-like consistency, and then the tablet is moved gently to and fro, until all parts of it are covered by the gelatine fluid, when it is put in its place on the rack, and then, in a similar manner, all the other tablets are regularly treated.

After a quarter of an hour, when all the fluid mass on the glass tablet begins to get consistent, the picture or ticket which is to be gelatined should be moistened with water on its back, with a sponge, and put on the gelatine. Any air-bubbles which may arise in covering should be pressed out with the hand towards the edges, and care should be taken that the edges of the picture adhere well.

In this state the sheets should remain from two to three days, lying on the rack until they are completely dry, when, with a blunted or dull knife, the surplus gelatine at the edges is cut away, and the card, which now adheres fast to the gelatine, is taken off the glass tablet.

It should be understood that the frame and glass of the used tablets must be carefully cleaned from the adhering gelatine before they are used again.

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CHAPTER XXII.

TRADE CUSTOMS AFFECTING MACHINE OVERSEERS, MINDERS, AND BOYS —Damages for Spoiled Work—Detention of Machines, &c.

MACHINE-WORK is comparatively such a modern institution of the printing business that its customs have not been as fully defined and settled as those of the other departments of the trade. It is worthy of notice that many of the restrictions which trades unions have imposed upon the composition and press branches have not been attempted to be applied in this case. There is no limitation to the number of apprentices, no specified term of apprentices' servitude, and a person who undertakes to work a machine is seldom asked whether he has "served his time;" if he be capable of doing what he undertakes, the manner in which he acquired his knowledge, and the house in which he gained his experience, are not generally inquired into. Hence, as far as this department of printing is concerned, there are no "unfair" or "rat" houses, and no scale to regulate wages. There is in London a Machine Minders' Society, but its members may work in any office they please, provided they do not accept less than a specified rate of remuneration.

This society is not exactly governed on trade-union principles, as admission to it and conformity with its regulations are altogether voluntary. If, however, a person applies for admission, he must at the time of the application and during eighteen consecutive months previously have had the management of a printing machine. He must also have served an apprenticeship of seven years, three of them while he was between the age of 18 and 21. The time considered as a week's work is 54 hours, and no member must receive less than 36s. per week, and 11d. per hour overtime. One of the regulations is that "members are not allowed to bring up cuts at their own homes; if any member does so, he will for the first offence be fined 42s., and for the second be excluded."

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The workers in the machine-room are regarded as belonging to three classes—(1) the Machine Overseer, (2) the Machine-minders, (3) the Machine lads. The last-named are sometimes called "layers-on" or "takers-off," and in the country "feeders," according to their duties; but these terms are now discarded in London. The term "minder"—meaning one who takes care of or "minds" a machine—is not a very elegant or expressive one, but it has already fully established itself in the technical terminology of the trade. The word "pointer" has lately come into use to describe a man who can do work requiring exact register, with points; advertisements being worded, "Wanted, a Pointer, at the Wharfedale," &c.

The machine overseer superintends the various minders, who in their turn superintend the lads. The overseer in some offices is required to fill up his time by making ready overlays for the different machines. A proof of every job is brought to him before it is worked off, and he is held responsible for the making ready, overlaying, colour, &c., at the start. If the minders, however, deviate from the colour settled upon at the beginning, or allow of bad work—such as creasing, formes rising, &c.—they are held responsible. It is their place, too, to see that the laying on is accurately done, and the "backing" or perfecting correct.

Machine Overseers.—The general practice in the trade is to give and expect, in the case of a machine overseer, four full weeks' notice. In some offices, however, the custom is different, and the overseer of the machine-room is considered as one of the ordinary 'stab. hands, and therefore entitled, as in the case of compositors and pressmen, to only a *fortnight's* notice. If this latter plan be adopted, it should be distinctly pointed out to the workman on his engagement; otherwise he will be entitled, in virtue of trade custom, to the month. The following is a case in point:—

A machine-minder was engaged, as a permanency, to act as machine overseer, and at a regular weekly salary. Subsequently, not liking his place, he gave notice of his intention to leave—the regular notice of four clear weeks. Before this time had expired, however, he was discharged by his

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employer. He therefore sued for four weeks' wages in lieu of notice of dismissal. In court a discussion arose in reference to the limit of the ordinary notice of dismissal, and whether it was customarily a fortnight or a month. The plaintiff urged that the latter was the general custom, while the defendant submitted that no workman in the printing-office, whatever his position, was entitled to more than a fortnight. The judge, after hearing evidence as to trade custom, gave his decision for the full month's salary, as claimed by plaintiff, but remarked that all such contracts should be made in writing. It is evident, however, that as precedents accumulate there will be less necessity for this being done; but, where there is an understood departure from this custom, it is advisable to make a special contract.

Machine Minders.—At the Wandsworth Police Court, a journeyman was summoned by a master printer, under the Employers and Workmen Act, for leaving his service without notice. The complainant said that the defendant was employed at 36s. per week, and left without giving notice. The usual notice was fourteen days, or two full weeks, on either side. He claimed, accordingly, £3 12s. compensation for the loss he had sustained, being equivalent to two weeks' wages. He produced the rules of the Compositors' Society, to which the defendant belonged, in which the notice of fourteen days was specified. His office was a Society office, employing only unionist hands. The defendant said he had formerly been a member of the Compositors' Society, but had retired from it, and ceased to pay any subscriptions to it. The magistrate ordered him to pay £3 12s. and costs. It will be seen that the decision turned on the question of trade custom, and was not founded on the regulations affecting compositors, although in this case they happen to be similar.

Owing to the dependence of the machine lads upon the minder, and their inability to work unless the latter has made due preparations for them, responsibilities arise which have no counterpart in other branches of the printing-office. At the Mansion House Police Court a journeyman was summoned by his employer for leaving without finishing the

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work he was engaged to do. The plaintiff claimed from the defendant two weeks' wages at 32s. per week, and 8s. each for the two boys who had been kept idle through his conduct. The defendant, in answer to the charge, said that he had got a job that would bring him in £6 in a fortnight. The magistrate fined him 20s. and costs—half the fine and costs to go to the master (whom he had put to great inconvenience), as remuneration for the wages paid to the two boys whom the defendant, by leaving without notice, had kept unemployed.

At the Manchester Police Court, in 1873, a machine-minder sued his employer for a fortnight's wages, £3 6s., which he alleged was due to him by reason of his dismissal from work without notice. The plaintiff saw an advertisement in a newspaper, and went to the defendant's place of business and applied for a situation as machine-minder. He said he wanted 35s. per week. Defendant said he had been paying only 33s. to the man who was leaving. It was agreed, however, that plaintiff should commence work at 33s. a week, and that he should have 35s. a week in a short time if he suited. He was to act as machine-minder, and to "fill up his time" at press and case. Plaintiff entered on his duties on a Saturday, and remained at work until the following Saturday, on which day he received his wages in a parcel, and when he opened the parcel he found that it contained 36s. He inquired how it was that he had received that sum instead of 33s., and was told by the foreman that the man who had been discharged for incompetency was coming back on the following Monday morning. No complaint of his work had been made to him previously. It was submitted, on behalf of the plaintiff, that by the rules of the Provincial Typographical Society he was clearly entitled to a fortnight's notice. No witnesses in support of this representation were called. Defendant contended that the plaintiff was not entitled to any notice, inasmuch as the service was only a temporary one. He said that it was only in the event of the plaintiff suiting him that he was to have a permanent situation. The magistrate said that as the plaintiff had entered upon the second week's work he was entitled to be paid for the whole

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week. Defendant was ordered to pay plaintiff one week's salary, less the 3s. he had received for the Saturday's work.

At the Guildhall Police Court, in 1874, a workman engaged in the machine-room as wetter of paper was summoned under the Masters and Servants Act, 1867, for leaving his work without proper notice. It appeared that he was engaged by the machine overseer at 24s. per week. He gave satisfaction until a certain Monday, when, after having obtained leave to go away an hour and a half before the usual time, he left his employment without giving proper notice. In consequence of this conduct one of the machines stood idle for two hours. The defendant said the reason he had left was that the overseer had abused him for being late in the morning; but this the overseer denied. The magistrate said it was clear the defendant left his work without giving proper notice. He must pay a fine of 20s. and 3s. costs, or go to prison for fourteen days.

At the Lambeth Police Court, in 1876, a claim was brought to recover 12s. 1d. wages. The plaintiff had been for some years in the employ of the defendant, a master printer. When first engaged his wages were 5s. 6d. per week, as "taker-off," but he was afterwards promoted to the post of machine-minder, at a salary of 14s. per week. The machine broke down, and the plaintiff was kept for two-and-a-half days rolling at a hand press. When the repairs were finished the foreman refused to allow him to work that machine, and told him to work at a treadle machine, or leave the place. As he alleged he had previously been laid up for a considerable time through working a treadle machine, he objected, and the foreman told him to go about his business, and he did so. The foreman to the defendant said that no work had been given to plaintiff to do while the machine was under repair, although he was "about the place." The machine was repaired on the Tuesday, and as witness thought he (plaintiff) had been careless in minding it, and thus contributed to the accident, he put the man who had been on the treadle to take charge of it, and offered the treadle to the plaintiff, who said he would rather starve than work on it. The magistrate said it appeared to him

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that the plaintiff had disobeyed the lawful orders of his employer's representative, and gave judgment for the defendant, with costs.

Although it is very unusual to introduce the system of piece-work into the machine-room, cases arise where payment can be arranged on that basis, especially when long numbers are run off. Under such circumstances it should be clearly understood between the parties on what terms the work is being done. A case was heard in the City of London Court, in 1877, in which the plaintiff stated that he had been employed by the defendant as a machine-minder for twelve months; his wages were, "on an average," £2 13s. weekly. The Commissioner asked the plaintiff, "What average?" Plaintiff said he worked for six days and one night per week, and he was paid "piece-work," receiving 40s. weekly and 11s. for night-work. The Commissioner then inquired how, if the plaintiff worked by piece-work, he could sue for weekly wages. The plaintiff said it was true his was piece-work. The Commissioner then told him it was very important for him to be clear as to weekly or piece-work, for if he worked piece, then, though he were to sue for a weekly wage, he would be unable to recover a farthing. Plaintiff said he was paid 11s. for the night-work done. The defendant, the employer, was examined, and stated that the plaintiff received 40s. per week, and 11d. for every extra hour worked. The overseer proved that plaintiff's dismissal was the usual one, he having had a fortnight's notice from himself. The Commissioner gave a verdict for the defendant.

Damage to Work.—A further responsibility arises in the machine-room which can hardly exist in any other part of a printing establishment. It is that for damage owing to imperfectly executed work.

An action was brought by a master printer to recover the sum of £2 16s., the value of work which it was alleged a machine-minder had spoiled. It appeared that 2,500 pamphlets were printed, which were returned by a customer on the ground that they were misprinted. In some of the sheets, owing to the bad "lay," the letterpress was cut off, and there was no margin. The defendant pleaded that this

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was no fault of his. Though employed as a machine-minder he was on this occasion sent to feed in the sheets, an operation which it was impossible to perform properly, as he had to look after two machines and an engine and boiler. He further alleged that feeding was boys' work, and he would not be responsible for the execution of it. The judge said that whatever a workman might be employed on he was bound to do as well as he possibly could. The defendant's solicitor contended that there was no legal liability on the part of a servant to make good loss of this kind. Plaintiff and his son stated that when the spoiled work was returned defendant agreed to make good the loss by paying 3s. or 4s. per week, but refused to sign an I O U for the £2 16s., and his wages were stopped, but had since been sued for and paid into court. The judge held that defendant was bound to follow his employer's orders, and in a proper manner to execute the work assigned to him. Verdict would be in favour of plaintiff.

In 1875, in the City of London Court, a machine-minder sued a master printer for three days' wages. The defendant said that plaintiff discharged himself because he had been required to pay for three reams of paper spoiled through bad workmanship. The plaintiff had printed off a number of copies of a weekly periodical so much out of "register" that they could not be folded. The plaintiff said that no regular boy could be found for him, so one was engaged out of the street, who put the paper on the machine wrong, not knowing anything of the business. The judge said that if that were so it was plaintiff's duty to refuse to work with the boy, and not to go on spoiling work. Judgment for defendant.

Employers, however, must not deduct for damages out of wages, but, if necessary, bring a separate action.

In the City of London Court, 1876, the plaintiff, a machine-minder, sued the defendant, a printer, for 5s., one day's wages, which he had refused to pay on account of plaintiff spoiling some work. The judge told defendant he must not make himself judge in his own cause by stopping for the damage, but must sue for it in a separate action. Judgment for plaintiff.

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Machine Boys.—The custom as to engagement of these lads is not so clearly defined as is that relating to overseers and minders. One week's notice is usually given on each side. The boys, however, have certain responsibilities arising through their negligence, incompetency, or misconduct, as the following cases will indicate:—

A machine-boy brought an action in the City of London Court against his employers. His wages were 9s. per week; he had been dismissed without notice, and claimed his wages for the week. He had been absent from work an hour after tea-time before he had been dismissed, but that, he said, was because he had a headache. The defendant's manager said that this lad, with many others, was in the habit of going off to play in a certain place, and then going to their "houses of call" in Fleet-street, in their master's time. The machines during this time were idle, and the firm losing money on them. The boy admitted calling at a place, as it was the custom of the boys to do, to see if any boys were wanted, on his way home, and he went straight home after that, having a headache. The judge asked plaintiff why he went looking for other work while he was in the employ of the defendants, and he said all the boys did that. The judge said he did not believe the story of the headache; the boy had forfeited his wages by not returning to his work in time.

At the Southwark Police Court a machine lad summoned his employers for refusing to pay him a week's wages. He said that he was paid 6s. 6d. a week, and on the Friday before a Bank holiday he left work at one o'clock and did not return. He was absent also on the Saturday, but on Monday he went to resume his employment and was sent away. He had obtained work at another establishment, but as defendants had refused to pay him his week's wages, he took the present proceedings. In answer to the magistrate, he admitted that instead of going to work on the Saturday he roamed about the streets with another lad. The overseer said that they employed two or three hundred hands, and it was imperative they should have proper regulations. The complainant left his employment suddenly, causing considerable inconvenience; in fact, a machine

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was kept entirely idle, causing a loss to the firm. He referred the magistrate to the 11th clause of the Employers and Workmen Act, 1875 (38 & 39 Vict., c. 90), which gave employers power to claim a set-off in consequence of damage by factory workers by absence or otherwise. Another lad, late in the same employ, said that the complainant induced him to leave his work on the Friday and part of the Saturday. He had not been paid his wages. The magistrate said that both of them had forfeited any claim on their employers by absenting themselves from work, causing damage and loss. He consequently dismissed the summons.

In another case before the City of London Court four lads were brought up on summonses charging them with having absented themselves from work without having given or received the notice agreed upon. The summonses were taken out under the Employers and Workmen Act of 1875. It was represented that the defendants were more or less in the habit of abruptly and without notice leaving their work, and going to seek employment elsewhere. The usual effect of such conduct was more or less to retard the work on which they happened to be engaged for the time being, and to inconvenience those for whom it was being executed. Defendants being very young, the firm intimated that they did not wish to press the charge harshly against them, and would be content to have them admonished from the Bench, as well on their own account as in the hope that such an admonition would have the effect of deterring others from similar conduct. In the result the Court decided to postpone judgment for a month, with the view of affording the boys an opportunity for considering and amending their conduct towards their employers. Defendants meanwhile would have to pay the cost of the summonses.

The preceding cases are selected as showing the customs of the trade, but employers must remember that in addition they are bound by the ordinary legal responsibilities of servants to masters. These, of course, would be out of place if enumerated in a practical trade handbook like the present.

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PART THIRD.—STEREOTYPING.

CHAPTER I.

USES AND VARIETIES OF STEREOTYPE—The Paper Process—Materials and Apparatus—Manipulation—Preparing the Paste—Making the Flong—Stereotype Metal—General Hints.

STEREOTYPE is a word compounded from two Greek words —*stereos* fixed, and *typos* form; stereotype printing being the art of taking impressions from a fixed or immovable forme, and is thus distinguished from typography, in which impressions are taken from mobile or movable types. The word itself was first invented by Firmin Didot, the French printer, towards the close of the last century, but this system of printing may be said to have been invented by William Ged, a Scotchman, in the early part of the eighteenth century.

Stereotyping does not supersede typefounding, but merely supplements it; it acts as an auxiliary, but not as a substitute. A page of reading matter printed from a stereotype plate requires first of all to be set up letter by letter. When it is so composed, however, one or many plates or casts can be taken, each of which may be printed from with as much perfection, practically, as from the original type. Herein consists the value of the stereotype process. If a tract or handbill is required to be printed, it may be set up and any number of casts taken, instead of composing the type again. Two, four, eight, or any convenient number of casts can be laid down on the press and printed from simultaneously, thereby multiplying production in the proportion of the number of casts. The original type forme need not be printed from at all, which results in great saving of wear and tear. Nor need the type be kept standing for another edition; the plates may be put aside and printed from whenever occasion requires it.

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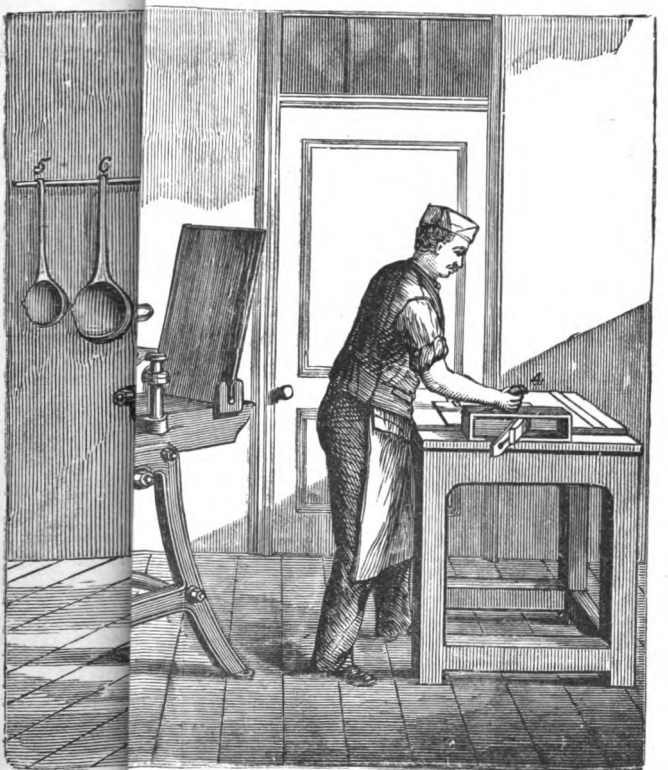

The two essential parts of stereotyping are—1st, the mould or matrix; 2nd, the plate or cast. The latter is

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Stereotyping was originally proposed on account of the facilities it afforded for the production of new editions of books, such as the Holy Scriptures and the classic authors, which are reproduced frequently, and without alterations in the phraseology. It was seen that not only would the expense be saved of resetting the type each time an addition was wanted, and the expense of keeping type locked up avoided, but absolute correctness would be ensured, if correctness were attained in the original edition, as the stereotype process would effectually obviate any alteration. The manifold advantages of the stereotype system were soon found to connect themselves with job-work as well as book-work. Newspaper-work has been also benefited by the system, not only in duplicating, triplicating, and even quadruplicating formes, and thus printing in a given time twice, three, or four times the number of copies, but in permitting of prints being taken from a circular forme, obtained by stereotype.

No large printing-office now dispenses with stereotyping, but we would just say that few small offices can afford to do without it. It is in the latter class of offices, indeed, that its advantages are most obvious. Where the stock of type is small, such a simple and cheap method of increasing it is most important. It does away with the necessity of keeping many standing formes. It reduces the wear and tear of type. It increases the productiveness of a limited stock of machinery or presses. It dispenses with labour, and saves room; and in fact economises time, money, and material to an extent which would hardly be credited by those who have not experienced it.

The art is simple, and the apparatus comparatively inexpensive. Any intelligent youth can be taught to practise stereotyping, and an entire foundry, with all necessary utensils, may be purchased for considerably less than twenty pounds. The following instructions will have reference to such an outfit; as we have not space to describe the operations of large stereotype foundries.

The two essential parts of stereotyping are—1st, making the mould or matrix; 2nd, the plate or cast. The latter is

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always formed of an alloy, which may here be said, generally, to be somewhat similar to ordinary type-metal.

There are now two materials from which the mould is usually formed—viz., plaster of Paris, and paper; and these divide stereotyping into "the plaster process," and "the paper process." The system of forming a plate by deposition in an electric battery is also a kind of stereotype, but as it is known as Electrotyping, and practised as a separate art, we defer its consideration until stereotyping has been disposed of.

The paper process is unquestionably the simplest of the three processes named, and we will begin with it.

Materials required.—The following is a list of materials required for casting small plates—say up to royal folio. For larger sizes several more elaborate utensils are desirable.

Melting Furnace.—(No. 3 in engraving.*) The use of this is to melt the metal required to form the cast. Any stout iron pot, with a flange to rest on the furnace, will do for a melting-pot. The fumes from type-metal are somewhat prejudicial to health, and should therefore be carried away by means of a flue, or chimney, placed over the melting-pot.

The makers of the portable stereotyping foundries have introduced specially contrived gas furnaces for this purpose, which are exceedingly convenient. They are heated by an "atmospheric" burner attached to a piece of flexible india-rubber tubing, which is connected with the gas-pipe. They are thus easily put aside when not wanted, and the heat is quickly got up when necessary, without the dirt and trouble of coals. Another advantage is that the insurance companies do not levy any increased rate on account of these appliances. The furnace is double, one part holding the metal, and forming the pot, or crucible, and the other forming a hot-air chamber when the gas-jet inside it is ignited. A sufficient quantity of metal can be got ready for use in about thirty minutes. The pot is provided with a movable lid (3 x) to keep out dirt and dust when not in use.

* The engraving is kindly lent by Mr. Moreton, of Bishopsgate-street.

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The Drying and Casting Press.—This apparatus (No. 2 in the engraving) is the most important feature of the paper process. The mould is formed of a composite kind of damp paper (papier mâché), and requires to be dried before it can be cast from. The press consists of a flat planed iron surface. Attached to one end by hinges is a lid, which is raised and lowered like the tympan of a printing press. At two sides of the bed are two upright pillars, and between them a movable plate into which a screw works, being actuated by two handles. When these handles are turned the screw descends, like that of a copying press, and exerts any required pressure upon whatever may be below. In short, this screw, together with the lid of the press, will squeeze, on the platen principle, any forme laid on the bed underneath. The screw piece, or head of the press, is made to move laterally, so as to be out of the way of the lid when turned down or raised up. Underneath the press there is a gas-burner to heat it, this burner being connected by a flexible gas-pipe with the ordinary gas supply of the apartment.

The bed of the press stands on four iron supports, but it is attached to them only on an axle, and can be changed from the vertical to a horizontal position. A pin, fixed in one side of the stand, keeps the table in a horizontal position when necessary. The object of setting it upright is to pour down into it the molten metal when casting.

Ladles.—(See Nos. 5 and 6 in the engraving.) These are of the ordinary kind used by founders. Two of them will, at least, be required, one having a bowl four inches, and one about two inches in diameter. They are used for transferring the molten metal from the melting-pot to the casting-box, or press.

The Skimmer.—(No. 7 in the engraving.) A ladle with a perforated bowl. It is used for removing impurities or foreign matter from the melting-pot while the metal is being melted.

The Mallet.—(No. 8 in the engraving.) Shaped like an ordinary carpenter's mallet, and with a squarer head than that used by the printer.

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Chisels.—(No. 9 in the engraving.) Two of these are required, one being a half inch broad, and one an inch broad. They are used, with the mallet, for trimming the plates.

The Hammer.—(No. 10 in the engraving.) Which calls for no special remark.

Beating Brush.—(No. 11 in the engraving.) A strong hair brush with a handle, used for beating the paper pulp into the interstices of the type. It should be about five inches long, and two and a half broad, and have a handle about seven or eight inches in length.

Oil Brush.—(No. 12 in the engraving.) A small brush used for oiling the face of the forme previous to taking the mould, and for preventing the paper adhering to the forme.

Chalk Brush.—(No. 13 in the engraving.) For removing the superfluous chalk from the surface of the paper mould.

Paste Brush.—(No. 14 in the engraving.) For pasting together the sheets of paper which are to form the mould.

Casting Gauges.—(No. 16 in the engraving.) They serve to regulate the thickness or height of the plate by keeping the lid and the table of the casting-box at the proper distance apart.

Plane and Shooting Board.—(No. 4 in the engraving.) This is used for planing the backs of the plates, and for bevelling their edges if necessary. It should be set up on a strong bench. A circular saw arranged in the side of the latter is a very useful addition.

A Hook, for lifting the lid of the melting-pot (No. 15 in the engraving).

These are all the special apparatus that are required; but several materials and appliances generally found in a printing-office must be brought into use. For instance, a small imposing surface must be arranged so as to stand near to the casting-press and the melting-pot.

The plates are cast from a papier mâché matrix called a *flanc*, or as it is phonetically written in this country, "flong."

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This flong is formed by uniting several sheets of paper by means of a kind of paste, for which the following is a useful recipe; but there are many different ones preferred by various stereotypers.

To make the Paste.—Take 1 lb. good wheaten flour, 9 oz. white starch, 1 dessert spoonful of powdered alum. Mix up smoothly with a sufficient quantity of cold water for the purpose, and boil it in the usual manner for making bookbinders' paste. When it is required for use, mix intimately with it an almost equal quantity of pulverised whiting.

Prepared paste or "stereotype composition" may be had from the printers' brokers in tins, ready for use.

The mode of using this composition is to take 1½ lb. of it, add 1 lb. of whiting and one pint of hot water. This mixture when cold should appear in substance like very thin bookbinders' paste.

To make the Flong.—Lay down upon a smooth iron or stone surface a piece of stout brown paper. Paste the surface of this over equally with the paste already mentioned. Lay a sheet of good blotting paper upon the pasted surface, and press it down with the hand. Paste this over, and then put another sheet of blotting paper on; smooth well, paste this over; then place a sheet of good tissue paper or copying paper upon the blotting paper. Press it well down again, paste over again, lay another sheet of tissue on the last, and smooth the whole carefully. Some stereotypers pass a small steel roller over the flong to better incorporate it together, and give it greater firmness.

Flong may, like the paste, be had ready prepared; or it may be made with the above paste in the following manner: Paste a sheet of thick blotting paper evenly with the prepared composition and lay upon it a sheet of tissue. Turn the sheet and paste the blotting paper again, and lay upon it a sheet of thin demy paper. Turn again and paste the tissue side, and lay down a second tissue. Paste again and lay down a third tissue. This flong must not be immersed in *hot* water; with this exception it may be treated according to directions given below for making the mould.

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Having the flong prepared, we are now ready to begin casting. If one of the portable foundries such as is above referred to be used, the gas jet under the drying and casting press should be lighted. The lid should be put down so that it may be warmed to an equal temperature with the rest of the press. This is necessary in order that the mould may be properly dried.

The gas burner in the furnace or melting-pot should also be lighted. In using the small gas furnace, when lighting the gas in the furnace the gas should in all cases be turned full on, and the light applied inside, from the top, by lifting out the metal pot. Should there be an insufficiency of pressure, the gas is liable to ignite at the bottom where the gas and atmosphere enter the burner, in which case the metal will not become fusible. The metal pot will become covered with a thick coating of gas black, and a suffocating smell will arise from the gas. If lighted properly the gas flame will be of a bluish colour, and the heat will be so intense that 100 lbs. of metal will be ready for use in half an hour.

Stereo Metal.—Take six pounds of lead, and one pound of antimony. Some stereotypers prefer to use 12 per cent. of antimony in a given quantity of lead. The antimony is a white metal, and so brittle as to be easily pulverised. When heated to redness it melts; at a higher heat it evaporates. It should be broken into very small pieces, and thrown on the top of the lead when it is at a red heat. Stereo metal ready prepared may be had from the printers' brokers.

The simplest mode of making stereotype metal is to melt old type, and to every 14 lbs. add about 6 lbs. of grocer's tea-chest lead. To prevent any smoke arising from the melting of tea-chest lead, it is necessary to melt it over an ordinary fireplace for the purpose of cleansing it, which can be done by throwing in a small piece of tallow about the size of a nut. Then stir it briskly with the ladle, when the impurities will rise to the surface, and can then be skimmed off.

Care must be taken in the mixing of lead and type-metal that there are no pieces of zinc in it. The least portion of

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zinc will spoil the whole of the other metal that is mixed with it.

Zinc is of a bluish-white colour ; its hue is intermediate between that of lead and tin. It takes about 80 degrees more heat than lead does to bring it into fusion. Should any metal float on the top of the lead, do not try to mix it, but immediately take it off with the ladle.

Another test of zinc in the type-metal is obtained by plunging a red-hot poker into the metal when it is at the heat that it would scorch a piece of paper black. If the metal does not adhere to the poker it is free from zinc ; if, on the contrary, metallic patches appear upon it, zinc is present.

The proper heat for casting is when the metal will turn a piece of white paper straw colour. If it makes it black, it is too hot. The mould, being paper, cannot sustain an intense heat.

General Hints.—The careless pasting of the blotting and tissue papers is a fruitful cause of failure in stereotyping. Great care should be taken with this preliminary operation, as bad flong will endanger the success of all that follows.

The imposing surface on which the forme will be laid, while the mould is being beaten into it, should be firmly fixed up, so as to prevent any vibration during the beating.

The iron plane should be so contrived as to prevent friction against the side of the plate, which would warm it, and perhaps distort its shape.

Where a number of plates are wanted, a saw and planing bench is almost indispensable. It should include a circular saw—6 in. diameter is a useful size—an imposing surface, and a plane and shooting bench. It should have a movable gauge or guide. The best article of the kind will have a steel spindle running on steel centres for the saw, a band and treadle to actuate it. The top should be capable of being lifted off while the saw is being adjusted. The plane should be fixed at the right hand side, and have a receptacle underneath for catching the shavings of metal. The circular saw should be placed at the left side. Under-

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neath the surface a couple of strong drawers may be fitted up.

Having compounded the flong for taking the mould, and got the metal hot and ready for making the cast, the next thing to do is *to prepare the forme.*

Place the forme on the small imposing surface and unlock it. It must be prepared for moulding from by being surrounded on all sides with metal furniture or clumps, type-high, and about a pica or two thick.

Metal type-high furniture is much superior to wood, and should always be used when possible. If you have a small stock of metal furniture in lengths—which may be had from the printers' brokers—cut four pieces sufficient in length to go entirely round the forme, and enclose it as in a border. This furniture is bevelled or "chamfered" on one of the top sides, and the bevelled portion should be against the forme, and so as to leave about a nonpareil of "white" or open space between the face of the furniture and that of the type.

If you have not a supply of this furniture it is easy to make one. With most of the portable apparatus are sent out type-high gauges, which may be adjusted to the proper thickness, and the furniture cast with them as directed in the following paragraphs in the case of type plates. Of course you will not use any mould.

If the forme to be cast consists of eight or more pages, a little extra care must be taken in preparing it. Take out the furniture in the margins, and instead of it insert a piece of *double bevelled* type-high furniture between the pages. There will thus be a distinct break between each page, consisting of two channels or whites, caused by the double bevel of the furniture, and the furniture itself. In this way you will not only get a guide for the true and square dressing up of the plates, but an opportunity for separating those of the respective pages by merely knocking them, at the point where they are intended to be separated, against the edge of the imposing surface.

The side and footsticks are, of course, placed *outside* the furniture. Next tighten the forme a little with the finger.

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See that it is perfectly clean, that there are no spaces standing up, no leads or rules riding, and that the quads, &c., are all even and secure. If the forme is perfect, lock it up in the usual way, taking great care not to bow or bend it.

Ascertain next that the forme will lift with safety, that no quads or letters "dance" or become loose. Then slacken the quoins, so that they are not too tight to be moved with the fingers.

Next, *oil the forme*. This is done with the brush provided for the purpose. A little oil may be poured into the palm of the left hand, and the brush rubbed evenly into it. Apply the brush and the oil it contains only to the face of the forme, but let the latter have a complete, though slight, coating of the oil. Either sweet oil or olive oil may be used; the latter is preferable.

Again lock up the forme tightly, and in such a way that it is perfectly square and level on the face, and has no leads, spaces, letters, or quads out of their places. It may be planed down, as a further precaution.

Making the Mould.—Cut a piece of flong and two pieces of soft but stout wrapping or sugar paper to the size of the forme, including the type-high furniture. Immerse this piece of flong in hot water, in a similar manner to that for damping paper for printing. Do this three or four times, and each time immediately place it face downwards on a sheet of blotting paper to absorb the superfluous water. Whilst in this position, paste the two pieces of wrapper with ordinary bookbinders' paste, as evenly as possible, and lay them aside. For open work it is well to mix an equal proportion of whiting to that of paste. It will facilitate the drying and give body to the matrix.

It is a good plan, after damping the flong, to lay it face downwards on a sheet of dry blotting paper, on an even surface, and to roll it evenly with an ordinary office ruler. This will take out a great amount of water, facilitate the drying, and strengthen the matrix.

For open work, it is well to mix an equal proportion of whiting to that of paste. This will facilitate the drying, and give body to the matrix.

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Now, keeping the forme on the imposing surface, place the flong on it with the tissue paper side, to which the composition has been applied, next the type. Over it spread a piece of damp linen, and, with the beating brush, begin to beat the flong into the type. Take care to beat lightly on those parts of the forme which are open. Continue beating until the paper has well penetrated the forme, and sufficiently to give the required depth to the cast. This is a matter of experience and practice, but the knowledge when to leave off is soon acquired.

Next add one of the pieces of wrapper, already pasted, and beat it into the flong, having removed the piece of damp linen. Great care must be taken to effect a perfect union of the flong and the wrapper, and to exclude any air bubbles that may have got in between them.

If there are any white or very open spaces in the forme, it is advisable to fill them up with a little softened pipe-clay. Or a piece of thin millboard may be cut out and pasted upon the forme, so as to project a great primer above the face of the type.

Next lay the *second* wrapper, already pasted, on the back of that just finished. Again beat, somewhat lightly, and use similar precautions against the entrance of the air. The moulding is now finished.

The whole process of making the mould should not occupy more than five or ten minutes.

Some stereotypers vary the process already described, but in minor details only. After the flong has been applied to the forme, they exert a gentle pressure on it, by giving a slight pull at a printer's or a bookbinder's press; and the larger stereo apparatus have a special press contrived for this purpose. The object of this pressure is to fix the mould in its place. The precaution must be taken of laying a sheet of paper upon the back of the mould to prevent it from adhering to the platen of the press.

Instead of the damp linen previously spoken of, a piece of stout calico may be taken and soaked in water. The

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superfluous moisture should be wrung out, and the calico, doubled, laid on the back of the mould.

Any large stiff-haired brush will do for beating, if it has a long handle. The beating over the fabric which covers the mould should be regularly and evenly done. The face of the brush must be brought down perfectly flat.

To ascertain if the impression is sufficiently deep, one corner of the mould may be carefully lifted from the forme. If the required depth has not been reached, replace the mould gently, and beat a little longer.

If there are extensive depressions in the forme, as in title pages, labels, and forms, a few fragments of an old mould may be cut out and pasted on such spots before affixing the sheet of brown paper.

Drying the Mould.—As already stated, we are now describing the use of the portable stereo foundries. All that is necessary, therefore, is to show how the drying can be done without the aid of a furnace, such as is used in large stereotyping establishments.

Lift up the lid of the drying and casting press, and place the forme on the centre of the surface, between the two upright pillars. Spread a piece of thick machine blanket over the forme, and immediately cover the whole with the lid, and screw it tightly down with the lever, say a little more than can be done with one hand. Let it remain in the press about ten minutes, then raise the lid, which will allow the confined steam to evaporate, and let the lid remain so about two minutes, to allow the matrix to dry thoroughly. Then remove the forme back to the imposing surface, and take off the mould.

Trimming the Mould.—It will be found that the metal furniture round the forme has left its impression, which looks like a frame round the type. The removal of the superfluous flong beyond this is called trimming the mould.

Trim the mould with a pair of shears, flush with the outside of the impression of the furniture. The latter is to serve as a resting-place for the casting gauge. Should any projection appear at the point where the metal is joined

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at the corners, &c., be particular to hammer it down quite flat. Paste a piece of stout brown paper on one edge of the mould. It should be of the same width as the mould and about four inches in length, and be brought up to the indentation left by the type-high furniture on the top edge of the mould.

When this is dry, dust the face of the mould well with powdered French chalk, applied by means of a soft brush. Then remove the superfluous chalk with the chalk brush. If you have not a chalk brush, turn the matrix face downwards and strike the back smartly with a cane, to cause the superfluous chalk to leave it. The mould is now ready for casting from.

Casting the Plate.—Place the mould on the bed of the drying and casting press, face upwards, and as near the centre of the two uprights as possible. Lay the pica gauges on the margin of the mould. Place another sheet of thoroughly dry smooth brown paper on the mould, to project the same distance as the one pasted on the matrix.

The paper that was pasted to the mould will be found to protrude several inches from the mouth of the drying and casting press. The paper last mentioned should also project to a similar extent.

Put down the lid of the casting press, and screw it down tightly by means of the weighted handle at the top. Take out the small pin attached to the side of the iron framework, and very gently alter the position of the press from the horizontal to the upright. It is now ready for pouring the metal on to the matrix.

The metal must be poured between the two projecting sheets of paper.

Previous to pouring the metal into the casting press its heat should be tested. Fold a piece of writing paper and insert it in the metal. Should the paper quickly turn a lemon colour it is ready for pouring. In all cases carefully remove the scum from the surface of the metal pot, in order to take into the ladle bright metal only. Take especial care that all the metal is perfectly dry and free from water. You may drop a piece of Russian or other tallow into

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the pot, in order to flux the metal, and skim off the impurities and dross, which arise to the surface, with a perforated skimmer. Warm the ladle before putting it into the metal.

Pour the metal gently and steadily into the casting press until it is full, or nearly so. Then restore the press to its former horizontal position and fix it with the pin as it was before.

Now unscrew the lid, and the cast will be seen. Turn the cast over on its back, and raise the mould gently, by working the forefinger of each hand gently along underneath the edge of the mould—being careful not to put too much strain on any particular part.

Sometimes, especially if there has been any paste or dirt on the face of the mould, it will not come off the plate. Plunging both into cold water may save the plate, but it will destroy the mould.

After the plate is cast it must be trimmed. The superfluous metal, called the "pour," must be taken off with a saw. The edges must be bevelled with the plane, and the back planed with another plane. If the forme is one of eight pages it should be separated from the superfluous pour with a saw or a mallet and chisel, and planed evenly all round, leaving about a pica margin from the matter for bevelling the edges, if required.

When the plates are cast type-high they are "cored" by placing a core or thick metal plate in the box above the matrix.

A scarifier and graver are necessary to remove any superfluous metal adhering to the plates. They are then to be pulled and the imperfections carefully noted. The proof is sent with the plate to the "pickers," who remedy those defects that are marked.

The preceding directions will, it is hoped, enable any one to cast an ordinary plate in one of the portable foundries which are now so much in use. They also exemplify the general principle of the process, and are equally applicable to the large machinery employed in extensive stereotyping establishments. A short account of the latter may, however, be of service.

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The stereotype furnace is about two feet square. It is in shape like an ordinary household washing copper, the melting-pot occupying the place of the copper. The front is of iron, and provided with a small door, through which the coals are supplied. Bars underneath and a small hearth allow of the removal of the cinders.

Extending about twelve feet laterally from the furnace, and on a level with its top, is the iron "surface." It is hollow, and forms part of the flue of the furnace. It is supported by one or more piers of brick.

At the extremity farthest from the furnace there is a screw press.

The forme is dried by being placed on this surface, and various degrees of heat can be applied according as the forme is placed nearer to or more distant from the furnace end. After moulding, the forme and matrix are placed under the press for a while, then allowed to dry on a warmer part, with a metal plate on to keep the mould down, while another forme is placed under the press, and so on.

The casting press is called a "casting register." It is placed on an axle on an upright stand. The construction is similar to that already described.

A complete foundry for general work consists of the furnace—with surface, press, drying chamber, flange and metal pot; the casting register; the moulding table and iron roller; the planing slab and planes; and the planing machine.

The Plaster Process.—The apparatus required for casting by the plaster process are the following:—

An oven, with metal pot and flange; a crane; dipping pans; moulding slabs; frames for moulding slabs; planing slab and two planes; finishing lathe. The pages of type * are first of all imposed in the composing-room in a stereotype chase. They are then sent to the founder, and go in the first instance to the "moulder."

* Matter for stereotyping by the plaster process should be set with stereotype spaces and quadrats, which are much higher than those used in ordinary founts. The spaces and quadrats prevent the penetration of the plaster to any considerable depth. Ordinary spaces and quadrats would be clogged with plaster, which would have to be broken off in distributing.

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The following is merely a slight outline of the plaster process, as space will not permit of a more detailed description :—

The moulder places them upon the moulding stone, and rubs the face with fine olive or sperm oil, in order to prevent the adhesion of the plaster mould. Around the forme, and fitting to it closely, is placed a metal framework, about three quarters of an inch in depth, called a "flask," and into this plaster-of-Paris in a semi-liquid state from the admixture of water is poured.

While the mixture is still soft it is well rolled or spread evenly over the surface of the type for the double purpose of giving a uniform thickness to the mould, and also of expelling, as far as practicable, the minute air bubbles, which, if not driven from the mould, would cause picks or small imperfections on the surface of the stereotype cast.

In a few minutes the plaster hardens into a compact mass, and the mould may then be lifted from the type.

The mould, with others, if necessary, is next placed, with the face downward, on the "floater," a plate of metal fitting on the inside of the "dipping pan." This is a large shallow cast-iron dish or box. At the top is a kind of arch, the middle of which has a screw thread, by means of which, and the screw, the lid can be brought down firmly on the back of the moulds. The entire apparatus is connected with a crane, by means of which it is steadily lowered into the casting kettle or pan containing the molten metal.

The metal rapidly runs into the open corners and sides of the pan, filling up every hollow space, and the minutest interstice in the plaster mould.

After about ten minutes have elapsed the pan must be raised and cooled off upon the cooling trough. The stereo casts may then be taken out, and sent to the finishing room for examination and approval. The backs are twice shaved in the levelling machines to obtain that perfect and regular thickness which is so absolutely essential to good presswork. They are side planed, chiselled, and thoroughly gone over for picks or other imperfections, which the most careful casting will not always prevent. A plate proof is taken,

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and, if the work is important, is read by a proof reader for errors that may have escaped former readings, or for defects that may subsequently have happened. Finally the plates are put in boxes, containing each from sixteen to ninety-six plates, according to their size, and delivered ready for the printer's use.

In regard to the comparative advantages and disadvantages of the paper and plaster methods, it may be stated that :—

a. The paper process is by far the most rapid, which is of great importance in newspaper and hurried work.

b. By the paper process a series of plates may be cast from one matrix ; in the plaster process, on the contrary, the matrix is destroyed when casting a plate, by releasing the shell or cast. Hence the paper process is the most useful when a number of casts are required from a job to be worked together on the machine.

c. The paper matrices may be preserved for future use, and can be packed and sent any distance at any time.

d. The paper process is the simplest, and can be practised, as we have seen, on a very small scale.

e. The plaster process, on the other hand, has the advantage over the paper process of giving finer and sharper casts, thus rendering it preferable for stereotyping woodcuts ; but electrotyping has now nearly superseded both methods.

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CHAPTER II.

ELECTROTYPING—Nature of the Process—Its Advantages—Preparing the Forme—Blackleading the Forme—The Moulding Tray—Pouring the Wax—The Moulding Press—Delivering the Mould—Building—The Building Knife—Blackleading the Mould—The Deposition—Backing the Shell—Finishing the Plate.

ELECTROTYPING is a process for separating the metals from their solutions and depositing them in solid form by means of the electric current excited by the Voltaic battery, and thus producing plates or stereotypes from which impressions can be taken by the methods usually employed in letter-press printing. Electrotyping, in fact, accomplishes in a superior manner nearly all the ends attained by the stereotype processes, and is to printers one of the most useful, interesting, and important of all modern discoveries.

Electrotyping has almost superseded stereotyping in reproducing wood engravings, as it produces better copies —copies, in fact, which are quite equal to the original block for working from. For obtaining plates of type matter it is also better than the plaster or paper processes, for millions of impressions may be taken without reducing the sharpness of an electro, while ordinary stereo would be almost worn out by printing a much smaller number. This, of course, arises from the superior hardness and toughness of copper, of which the surface of the electro is formed, over type-metal, of which the stereo is formed.

It costs less to stereotype a given surface than to electrotype it, and the operation can be performed, especially by the papier mâché process, in a shorter time than electrotyping; so that where speed or cheapness of first cost is a paramount consideration, stereotyping is to be preferred to electrotyping; but in all other cases, when duplicate copies of a forme are required, it is advantageous to electrotype them.

The galvanic battery, as improved and enlarged in its scope by Volta in 1800, furnishes the base of the art of

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electrotyping. Various improvements in the form and materials of batteries have since been made, but nearly all are constructed on the principles laid down by Volta.

It does not come within our province to describe minutely the nature of the Voltaic pile or battery. It is only necessary to say that by its aid metals in solution can be firmly deposited on a properly prepared surface or mould, and that by the deposition of copper in this manner upon wax moulds of engravings or type formes, electrotype plates are made. The Voltaic pile was well known to scientific men for nearly forty years before it was used for electrotyping purposes. This application was hastened by a discovery of the fact that when copper or other metals was deposited on the sides of a Voltaic battery, and subsequently removed, they furnished an exact facsimile of the inequalities of the surface to which they had been temporarily attached. This discovery furnished all the theoretical conditions for electrotyping which had not previously been explained by Volta and his successors; and it only remained to apply these principles effectually to the attainment of practical results, and to surmount a series of mechanical difficulties. Smee's battery is the most useful for the printer's purpose.

The process is divided into three parts: Moulding, backing of the plates, and finishing.

In preparing a forme for electrotyping, many of the books say that type-high spaces and quadrats must be used; but this is not absolutely necessary, and in practice low spaces and low quadrats are generally employed.

The forme, however, should be accurately justified, tightly locked up, and well protected on all sides by high clumps or type-high bearers.

To prepare *woodcuts* for moulding, lock up the woodcut in a chase with a type-high bevelled metal clump-border all round it. Brush the cut over sparingly with turpentine, to remove the printing ink which remains on the block after the taking of the proof. Should the cut be an old one, and the fine lines much clogged up, which the

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turpentine fails to remove, it is better to brush the cut with a hard toothbrush dipped in liquor potass.

The object of the type-high clumps is to prevent the wax of the mould from spreading; and the facsimile of them, forming an outside border to the shell, becomes a barrier to the metal, retarding it from getting to the face of the shell during the process of backing. It also forms a wall for the dogs of the lathe to bite firmly to, while the back of the plate is being planed.

The next thing is to ascertain whether the forme is the same height as the clumps, which is done by taking a straight-edge or a piece of column-rule and laying it on the forme. If the latter is not the same height as the clumps, it must be underlaid; indeed, the forme should stand a little higher than the clumps. Let the forme or cut remain until it is perfectly dry.

Blackleading the Forme.—The first process of the electrotyper, after seeing that the forme is clean and level, is to cover it with finely powdered blacklead or plumbago, and subsequently to remove all excess of blacklead by rubbing the palm of the hand over the surface of the type or woodcut. This is done in the blackleading tray, and the blacklead may be applied with a brush, taking care that it is well bronzed over, and, if an engraving, that no particles of the lead are left in any of the fine lines of the engraving. The blacklead must be free from all adulteration.

The Moulding Tray should be of the same shape, as far as possible, as the forme to be electrotyped. It may be of stereotype metal or of brass. In appearance it resembles a shallow printer's galley, but surrounded on all four sides; it is about a pica or an english in depth. Two pieces of stout copper wire are soldered on to the edge in such a manner that it may be suspended in the depositing trough.

Pouring the Wax.—The moulding composition is made of the best unadulterated yellow wax, to which, in cold rooms or in cold weather, from 5 to 20 per cent. of virgin wax is added. The wax is melted to prepare it for use, and a little powdered blacklead mixed with it; and it is then ready to be poured into the moulding case or tray.

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Warm the moulding tray a little, lay it on a flat table perfectly level, and with a tin ladle pour out the wax into the tray in a continuous stream, with a slow, steady rotary motion, within an inch or so of the sides of the moulding tray.

Let the wax set all over, and then brush over the surface with plenty of blacklead, laying it on with a soft hat-brush. The sooner the blacklead is applied to the surface of the wax, without disturbing the wax or marking the surface with the hairs of the brush, the better will be the mould, as more blacklead will be held on the surface.

The forme or woodcut must be moulded while the wax is yet warm, but it must be perfectly set. The temperature of the room in which this important process is performed must be maintained at summer heat.

The Moulding Press may be either a copying press (which is suitable for small jobs) or a stereotype moulding press. The higher the temperature at which the wax is moulded the less the pressure required.

Moulding.—Place the forme exactly under the centre of the platen, with the moulding tray containing the slightly warm wax upon it. The amount of pressure requisite to displace the wax must be learnt by practice; no directions can be given on this point.

Too shallow an impression causes a deal of work subsequently for the "building knife." On the other hand, an unnecessary depth of dip may result in damage to the mould in delivery.

Several presses are in use by electrotypers. They generally have lifting heads, with a weight at the end, to compensate for power in raising them. When the head is down, a movable cross-piece is fixed to two small uprights, and this is worked upon by a connection with a wheel and pinion, which causes the impression. The apparatus is extremely simple.

Delivering the Mould.—To separate the mould from the forme, a pair of "lifters" is required, although a thin screw-driver may be used instead. Insert carefully the lifters

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between the furniture of the forme and the edge of the moulding tray at the top and bottom of the page, and gently, with a steady hand, apply leverage, gradually, until the mould is relieved from the forme or woodcut. Should the mould not be a good one, melt the wax and begin again. Never lift a mould from the sides of the forme, or damage will result to the raised parts of the mould, which are to form the counters in the plate.

The mould has next to go through the process of *building*, which consists in dropping heated wax upon such portions as should be deeply sunk in the finished electrotype plate, that is, the places where "whites" are to appear after printing.

The *Building Knife* is made of copper; it is half knife and half spoon. Some use a heated *Building Iron*, or piece of iron shaped something like a poker, of convenient length, with a sharp point, which is applied to a strip of dry wax until some of the wax adheres to it; this wax is dropped in a melted state upon the portions of the mould which are to be raised.

If a building knife is used, there should be close at hand a small cauldron of melted wax, and a gas-jet, by which to warm the building knife. Draw the knife along the projections that are to be raised still higher, and the wax will follow. The object of this is that where paragraphs or open work occur, the parts can be lowered to obviate the necessity of chiselling the plates, as in stereotyping.

The building knife can also be heated by dipping it in molten metal, and the building can be done by holding the hot knife in one hand and a stick of hard, dry wax in the other, feeding the building knife as you go along the spaces between the lines.

Great skill is displayed by some electrotypers in building. It requires a steady hand to drop the wax exactly where it is needed, and to avoid dropping it upon any spot where it is not needed.

Blackleading the Mould.—The mould having been finished and pronounced satisfactory, has to be blackleaded. Very pure, fine, and lustrous blacklead should be employed for

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this purpose. The blacklead must be well brushed in, filling all the interstices of the forme. The entire surface of the mould must be effectually covered, to ensure a perfect deposit of the copper. The brush should be rather soft. To facilitate this operation, a *Blackleading Machine* is used in large establishments. The forme is placed upon a carriage formed of transverse bars, and is moved backwards and forwards by a handle and rounce, like that of a press. As it moves it comes under the action of the blacklead brush. There is a sloping shelf underneath, to receive the superfluous blacklead.

After the mould is blackleaded, every particle of superfluous blacklead must be removed. This may be done by blowing it with a pair of bellows having a broad nozzle, or by brushing it with a flat badger's-hair brush.

If the mould be held in the light, at a certain angle, the operator may discern whether even the finest lines are properly polished. If any line or letter appears dull, the blacklead is not sufficiently blown or brushed out of such parts.

Preparing the Blacklead Mould.—The mould now requires a further preparation, by having the back of the moulding pan coated with wax, so that copper will not be deposited upon it. Paint the back and sides carefully with the wax, and also the edges of the moulding tray, but take care that there is a bright metal connection between the copper wires spoken of in referring to the moulding tray and the blackleaded surface. This is necessary to ensure the deposit of the copper on the blackleaded surface, and it may be obtained by slightly scraping the edges of the tray from the places where the wires are soldered to the blackleaded surface. This bright connection is very important.

The Deposition.—The mould must now be quickly immersed in one of the apartments of the battery, where the process of depositing a copper solution upon the blackleaded surface of the mould is continued until a solid plate is formed, which, though it is scarcely thicker than a man's thumb nail, forms, when properly backed, the best and most enduring surface for letter-press printing that has ever been discovered. The battery itself is one of the marvels

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of modern science, being an offshoot of a long series of attempts to utilise discoveries appertaining to the mysterious domain of electricity.

As soon as it is placed in the depositing trough containing the copper solution, the moulding tray containing the mould must be hung on to the brass rod of the depositing trough with hooks. The connections must all be clean and bright. The connection of the battery having been made, and the copper plate to be produced placed in its proper position, the current of electricity being complete, submerge the mould in the sulphate of copper solution, hang on to the hooks, and see that the whole of the moulding frame is under the solution, where it can remain until the deposit is sufficient to enable you to judge if all is going on well. Should the copper deposit in places where it is not required, the spot must be dried, and the place stopped out with wax.

The time usually occupied to deposit thick enough for ordinary purposes is twenty-four hours; but this must be regulated by judgment. To prevent air-bubbles forming on the face of the mould, take it out of the trough, and dip it in diluted methylated spirits, half spirit and half water.

When the copper deposit, or, as it is technically called, the shell, is of the proper thickness, it must be disengaged from the wax by placing the mould with its back on an inclined board; then pour boiling water over the shell, gradually lifting it at one corner. The boiling water melts the surface of the wax, and allows the shell to be released, not, however, without having a thin coating of wax over the face of it, which should be washed out with a mixture of turpentine, benzole, and powdered emery.

The removal of the wax may be effected by placing the mould and the shell in a steam heating-table. The superfluous wax may be removed with a heated solution of common potash.

Backing the Shell.—Get a small earthenware gallipot, and into this place some zinc cuttings. Take it into the open air and pour on a quantity of hydrochloric acid (muriatic acid or spirits of salts). The instant the acid

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comes in contact with the zinc, heat is generated, an offensive gas is given off, and ultimately a soldering fluid is formed, which must stand till it is cool. The back of the shell must be evenly wetted with this with a brush. The next step is to tin and back the shell. Tin adheres readily to copper. Procure some good strip solder, fuse it, and pour from a ladle through a gauze strainer, letting it fall into water, which will cause it to become like irregular-shaped spots. Some of these must be sprinkled over the back of the shell after it is wetted with the soldering fluid.

For the next process a furnace is required, with a crane and tackle apparatus over it, to which is attached a pan, the shell being placed therein. Fix the tackle, swing the crane to its position, and lower the pan to the top of the type-metal contained in the pot above the furnace. The heat must gradually extend itself to the shell and the solder, and when the solder is fused the shell will be tinned all over the back, and ready to receive the fused type-metal. The iron melting-pot should be square, with a flange; it should be about three inches deep. Lower gradually till it floats on the top of the metal.

The solder being melted, pour molten type-metal (of the same temperature as the shell, if possible) over the shell, gradually and with a rotary motion, until the shell be covered and thick enough to enable the electrotype to undergo the operation of finishing. After remaining some time, draw up the pan, and let it cool as gradually as possible.

The metal for backing in must be poor; say a hundred-weight of type-metal to an equal quantity of lead, and five pounds of bar tin.

The plate when cool must be released from the backing pan, and be washed, on the face, with turpentine, benzole, and emery powder. It must then be dried and polished by rubbing it in sawdust, when it is ready for the lathe.

The back now requires to be roughly planed. By means of the plane, also, the plate must be squared. Then pass a straight-edge over it, make it perfectly level, and "chuck" it in the lathe. The back must now be planed perfectly

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true and level, taking off at one cut not more than a long primer or pica at the most. The gauge for the thickness of a plate is a pica, or sometimes seven-eighths of a pica.

The electrotype plate may be mounted exactly as an ordinary stereotype plate.

A complete electrotyping apparatus comprises the following:—

Moulding press.
Metal moulding-pans.
Wax levelling and cooling table and frame.
Copper (or stereo metal) wax pot.
Blacklead frame and brushes.
Mould-dressing table and raising iron.
Battery, with solution vat, rods, &c.
Backing-up metal pot, with flange and fire-bars, and crane.
Backing-up pans, solder pot, ladles, and a grate.
Lathe, circular saw, and planing machine.
Planing slab, planes.
Bringing-up slab.

Those who require fuller instructions than can be given within the dimensions of a general handbook like the present, will find them in "Stereotyping and Electrotyping," by F. J. F. Wilson (London: Wymans), prefixed to which is the fullest history of the invention and progress of the two arts that has yet appeared, written by Mr. J. Southward.

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PART FOURTH.

THE WAREHOUSE DEPARTMENT.

CHAPTER I.

GENERAL VIEW of its Functions and Arrangements—Entering the Work—Management of the White Paper—Warehousemen's Accounts—Drying the Sheets—Pressing—The Screw—The Hydraulic—The Boomer Press.

AFTER the paper has been printed in any of the methods referred to in the previous pages, it is sent to another and distinct department of the printing-office, and operated upon by a distinct class of operatives. This department is called the Warehouse, whose operations now remain to be described.

In the warehouse the printed sheets are counted, dried, and pressed. They may also, according to circumstances, require to be folded, collated, cut up, again counted, parcelled, and delivered to the customer, unless they are to be stored or immediately bound up, in which case they go to the binding-rooms.

As a rule printers are unduly careless as to the situation, the condition, and the arrangement of their warehouses. They regard them as the non-productive portion of their establishments, and keep down the expenses connected with them. This is really an injudicious policy. When estimating the cost of work, the expense of counting, drying, pressing, and packing up should all be taken into consideration, as they become an integral part of the necessary outlay upon any given job.

The chief structural requirements in regard to the apartment chosen for the warehouse are that it should be light, airy, and dry. It is almost impossible to prevent sheets being smeared and soiled when they are stacked in darkness; indeed, losses through disregard of this considera-

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tion amount to a formidable item in not a few large and otherwise well-managed offices. A great quantity of paper is also damaged by damp, and further considerable losses thereby entailed. If possible, the room chosen should be protected from the dust of the street. In every part of the room the most scrupulous cleanliness should be observed, and the most methodical order should prevail throughout.

General Arrangements.—In planning a warehouse attention should first of all be given to the space available for counters or boards (as it is on these that the manipulation of the paper takes place), as well as to the space available for shelving, as upon that the capacity for storage will depend. The principal counters are generally disposed round the walls, and, if possible, three or four transverse counters run the length of the room. Between these, spaces may be left for stacks of printed sheets. The more judiciously the space is allotted, the better will be the degree of order and efficiency prevailing. At one corner, a space should be boxed off as a bookkeeper's office, and the head-warehouseman's desk should be at the head of the room, with an unobstructed view of the entire apartment. The counters are generally about 3 feet 6 in. in height from the ground ; they should be very strong, and four or five feet wide. Below the ceiling may be erected poles for drying the sheets, as will be referred to hereafter. If the room can be warmed by hot air or steam, it will be more comfortable, and otherwise better adapted for the work to be done in it. Immediate access to the street should be provided for, if practicable, by wide opening doors and a lift or hoist.

Machinery.—The apparatus of the warehouse may consist of screw or hydraulic presses, folding, cutting, and sewing machines, and the special appliances hereafter to be referred to. The presses are best fixed to the walls, resting on solid foundations, and supported by trusses or stays running from floor and ceiling. Screw presses, and hydraulic presses in particular, are very massive, and cannot always be used to their full strength unless they have special foundations. Cutting machines, especially the new self-clamping kinds, are also exceedingly weighty, and it requires some consideration to determine the place where

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they can be set up, so as best to perform their work. Folding and sewing machines are lighter, but they require to be more carefully protected, as valuable work may be spoiled on them if the necessary precautions against dust are not taken. Above all, everything must be kept in the most cleanly condition. There must be no excuse for dirt in the warehouse, and this applies to the hands and clothes of the operatives as well as to the machinery.

Entering the Work.—It is a rule in the warehouse neither to receive nor to part with even the smallest quantity of paper without proper written authority. Even when this authority is received, it must be filed, and whatever is done in accordance with it must be duly recorded in the several warehouse-books. The warehouseman must be ready at any time to state accurately how much white paper and how many copies of any given printed sheet he has in stock. It is obvious that it is only by a proper system of bookkeeping, rigorously carried out, that this end can be accomplished. In large offices the bookkeeping is done by the warehouse-clerk, and the direction of the hands employed alone occupies the principal warehouseman.

White Paper.—This sort of paper, as previously explained, includes all kinds of stock not actually printed. It will be brought in from the stationers, together with a delivery-note stating the number of reams, bundles, or reels that ought to be sent. The delivery-note is compared with the material, the parcels-book of the carter signed, and some of the hands arrange the parcels in a convenient place in piles. Then the quantities are entered into the stock-book, and the paper can be opened and stored.

At the appointed time, the warehouseman receives from the foreman of the machine or press department a note requiring the delivery of a certain quantity of paper. This must be attended to, and a receipt obtained for the quantity of the paper that has been given up, which receipt will be filed or passed on to the clerk to be entered in the stock-book. While the warehouseman is debited with all paper received, he is, of course, credited with what he delivers to be printed. Great care should be taken not to run short of paper for any job whose recurrence is known beforehand, such as the

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ordinary issues of a periodical, carelessness in this respect being regarded as a most serious offence. When the number of copies of a periodical is understood, the manager is supposed to confide in the warehouseman that he always has sufficient paper in stock, both for the edition and any probable extra demand that may arise; and if he has not enough paper, that he will at once acquaint the proper person of the fact. It will be evident from this that the utmost accuracy is necessary on the part of the warehouseman. When the printed sheets come down from the press-room they have again to be counted and recorded, and a receipt given for them. After they have been folded, or pressed, or stitched, as the case may be, and before they are "sent out," they must again be counted, a record of this transaction being also necessary—so that at least four separate entries have, in a well-ordered warehouse, to be made concerning each lot of paper.

Various systems of bookkeeping are adopted, but all depend upon the necessities above referred to. A concise book may be divided thus:—

Work _____

Description of Paper _____

Received from Stationers.				Delivered to Press Room.				Received from Press Room.				Delivered to Publisher.			
Date	Rm	Qrs	Sht	Date	Rm	Qrs	Sht	Date	Rm	Qrs	Sht	Date	Rm	Qrs	Sht

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The whole of the columns of quantities are made to balance in this manner: To the quantity received from the stationers will ultimately require to be added the amount of spoilage in its passing through the press-room. So many "overs," or overplus sheets, according to the rule of the house and the character of the work, must be delivered to the press-room. A certain quantity of these will not come back. More spoilage will occur in the warehouse-room, and the quantity of perfect sheets, as recorded in the last column, *plus* the spoilage, *plus* the overs, will be equal to that in the first column, and the whole account will, as we have said, balance.

In addition to this check upon the stationer and the printers, as well as upon his own workpeople, the warehouseman is usually called upon to keep an account for the customer or the publisher, consisting of a statement of what paper he has received, and how much he has used, the balance representing the quantity in hand or in stock. The following is a form often adopted:—

PAPER ACCOUNT.

RECEIVED.	Rms.	Qrs.	Shts.	USED.	Rms.	Qrs.	Shts.
In stock, as per last Statement	15	0	0	For 2,750 Copies "P.R." 62 pp....	21	6	17
Aug. 26. Spicer Bros.	35	11	0	,, 2,500, 10 pp. ...	3	2	16
				Balance in hand	26	1	15
	50	11	0		50	11	0

On the left-hand side of this form is entered the date on which each addition to the stock was received, and on the right the particulars are filled in of the various jobs to which the paper has been applied, the two sides of course balancing each other.

The following set of forms, used in a large London establishment, are suitable for offices in which the preceding system of keeping accounts would not be sufficient.

The wholesale stationer delivers the paper, as ordered, to the warehouse. It is accompanied by a delivery note, containing particulars of quality and quantity. The invoice is sent afterwards to the principals, that is, to the office or counting house. It is afterwards passed to the warehouseman, so that he may verify the items.

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If the items in the delivery note are correct, the warehouseman records the transaction in the

PAPER RECEIVED BOOK.

DATE.	QUANTITY.			MILL NO. WEIGHT.	COST PER REAM.	SIZE AND QUALITY.	FROM WHOM RECEIVED.	TOTAL COST.	FOR WHAT JOB OR FOR STOCK
	Rm	Qrs	Sht						

If the paper is supplied by the customer for the purpose of his own work, he should be advised of the receipt of the goods, in a form something similar to the following :—

ADVICE OF RECEIPT OF PAPER.

_____ 188

To _____

_____

Received this day, _____ reams, _____ quires, _____ sheets, of _____

Mill No. _____ from _____

for _____

(Signature of Warehouseman)

_____

NOTE.—Please verify these figures, sign the form, and return it without delay.

It is often advisable to send with this note a sample of the paper as received.

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When it is required to use the paper, the Press-room or Machine-room Overseer, according as to whether the job is to be worked at press or machine, sends an order for the quantity required, as follows:—

ORDER FOR PAPER.

_____188

No._____

To the Warehouseman:—

Please supply_____

_____for_____

_____

(Overseer's Signature)

*** No workman will be supplied with material unless a duly signed order in this form is presented.

It now becomes the duty of the warehouseman to record the delivery of this paper. He therefore enters it as follows in

THE WAREHOUSE DAY BOOK.

NO. OF ORDER.	QUALITY, &C., OF PAPER.	SIZE AND PRICE.	QUANTITY GOOD PAPER.			WASTE SHEETS SUPPLIED.		
			Rms	Qrs.	Shts.	Rms.	Qrs.	Shts.

The paper having been printed, is returned to the warehouse, along with a ticket, containing a statement of the

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number of sheets, signed by the overseer of the printing department in which it has been worked off.

The figures in this ticket must be checked by the warehouseman, who has the sheets duly counted. This should be done before they are dried, folded, pressed, &c., as may be necessary.

The warehouseman has next to record the quantity of sheets in stock, as follows, in the

WAREHOUSE STOCK BOOK.

NAME OF WORK.	DATE.	COPIES RECD.	DATE.	COPIES DELIVERED.

Drying the Sheets.—The printed sheets are brought from the machine-room and stacked up on the floor, or on shelves or benches, preparatory to being dried. By means of the Gill Hot-rolling machine, presently to be described, sheets may be pressed immediately after being taken from the press; otherwise, drying is the first operation which the warehouseman will undertake.

In very small offices, cords or lines are strung across the press-room; hence the phrase, "on the line." The paper is laid upon them by means of the "peel," a strip of wood to which a cross piece is attached. It is a prominent feature in engravings of old offices. A better plan is to erect poles or rods near the ceiling of the warehouse. After hanging the sheets up in parcels of a quire or so, they are left to dry by the ordinary evaporation of the moisture. This plan is open to three serious objections.

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It is dangerous, as the gaslights, often placed underneath, are liable to ignite the sheets, and perhaps set fire to the whole building. The plan is also defective from the tendency there is of the dust of the room discolouring the paper, particularly over the fold, or the "break," more especially as this exposure must be maintained for a considerable time. The plan also detracts from the orderly and methodical appearance which should always be exhibited in the warehouse.

The very finest kind of woodcut work can, however, only be dried properly in cold air. The process is slow and tedious, and involves much space. The best plan is to lay out the sheets in twos or threes upon trays. If there are very heavy cuts, the set-off sheets ought to be left in, as they come from the machine.

The best way of drying sheets, where it is practicable, is to use hot air or steam pipes. A room with stone or brick flooring, and bare walls, is the most suitable, as with the greatest care there is always the danger of fire breaking out.

The best arrangement that we have seen is one which may be described as a series of domestic clothes-horses standing nearly close together. Their front edges are wider than the rest of the frames, and approach each other quite closely, so that when all are in position the side of the series forms a complete partition. By making them run in grooves, one horse may be withdrawn at a time, and the sheets moved and replaced, the rest of them, meanwhile, not being exposed to as much cold air as if a wide door had to be opened. In such a room the work should be hung in quantities of about half a quire, although sometimes smaller and sometimes larger lots are better. The temperature of this room may be about 125 degrees, but this is a matter influenced by the character of the work, and one which experience alone can settle.

Some kinds of paper dry much more readily than others, and in regard to printing ink there is always danger that while it appears on the surface to be dry and "set," it may be more or less wet beneath. If a smear results from the

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finger being slightly rubbed over it, of course the sheets must be kept hung up for some time longer, but it is better to test one of them by laying over it a piece of printing paper, and rubbing the back of that with a paper-knife. If, when removed, there is no set-off, it may be taken for granted that the sheets are ready to be pressed or sent out, as the case may be.

Of late years the practice of *rolling* paper has come largely into vogue, to dispense with the process of wetting previous to printing. Paper so prepared prints as well, if not in some cases better, than when it is damped.

Rolling, or calendering, is not done in the printing-office, but by the stationers. Paper may be obtained that is rolled on both sides, or only on one side. It must be very carefully handled in the warehouse, being liable to soilage by the slightest circumstance.

As a general rule it may be said that printing paper, being more absorbent, is easier dried than writing paper. Ink dries most rapidly on a well-glazed printing paper. Some of the hard writing papers used occasionally for printing upon require to be hung up for many days before they are thoroughly dry.

If it be necessary to dry a few printed sheets immediately, for any sudden emergency, such as completing the sheets of a volume, calcined magnesia may be dusted over them, which will not sensibly affect the colour of the ink, and yet remove or absorb so much of it as remains above the surface of the paper. A pad of cotton wool is preferably employed, and the ink may then be rubbed over, as in applying bronze powders. Powdered French chalk is also useful, but it makes the paper very slippery.

Very fine work, when received from the printing-office, is generally examined, sheet by sheet, to ascertain whether there are any finger-marks or smears on the margin. Such may be removed by the use of stale bread, india-rubber, or an ink eraser; but fine glass or sand paper is also occasionally resorted to.

Pressing Paper.—When the paper is thoroughly dry, it is ready to be pressed, or smoothed, and freed from the

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indentations caused by the pressure of the types. It is usually held to be desirable that these should be removed, and that a perfectly level, polished surface should be given to the paper. In America, the acme of the printer's art is supposed to be reached when every trace of the pressure of the types has been removed, and the sheets present the smooth and glossy appearance of polished ivory. Amateurs of fine printing in France—the home of bibliophilism—on the other hand, rather prefer to see the effect of the pressure, and do not admire the high glaze so much valued elsewhere.

There are two distinct pressing processes in use, called respectively "Cold Pressing" and "Hot Pressing." Machines are constructed according to the requirements of both methods.

The earliest system adopted was to beat the printed sheets with a heavy hammer—a tedious and laborious process, and one requiring great dexterity. After this there was introduced the screw press. The smallest and most elementary appliance of the kind is called the "Nipping Press." It consists of a frame with cross-piece, into which a screw is wormed, to the end of it being attached a platen. The paper is placed underneath this, and the action of the screw bringing down the platen causes the necessary pressure. This machine is, of course, only suitable for small jobs, and it is made up to about twenty-four inches in length.

The screw, or standing press, is a development of the last-named. The sheets are placed either singly or in lots of three or four between "glazed boards." This process involves the handling of the sheets twice—first, in laying them between the boards and putting them in the press, allowing them to remain a number of hours to obtain the desired surface and finish; second, the removing of the sheets from the press and taking them out of the boards.

The glazed boards are made in various sizes and thicknesses. They are somewhat costly, but only the best ought to be used, as they are more economical than the thin descriptions. For "filling in" the boards, two boys

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or girls are employed. One stands before the pile of paper, another on his left before the pile of boards. One lays down a board, the other instantly deposits on it a sheet, immediately after which the first lays down another board, and so on, till the whole of the paper is between boards, The heap is then taken to the press and placed on the bottom or bed. The arm—a long lever—is then placed in the slot left for it, and by thus turning the screw the whole is pressed. The piece answering to the platen of a printing press is called the "follower;" the space between that and the bed is called the "daylight." Some screw presses are actuated by a three-limbed appliance like the three legs in the arms of the Isle of Man, and are called "Athol presses."

The warehouseman should be very particular to ensure that the work is thoroughly dry before it is put into the press. If this be neglected, there will be a set-off on the glazed boards, which will reappear on a subsequent lot of sheets being set in.

The deficiency of the screw or standing press consists in the fact that it is impossible to get sufficient pressure from it for certain kinds of work. Hence there was invented the "hydraulic press," which is sometimes called after its originator, Bramah, the engineer. It depends upon the principle that a pressure exerted on the surface of a liquid is transmitted undiminished to all parts of the mass and in all directions. We must omit details of construction, but the following are the essential parts of the machine: Into the cavity of a strong metal cylinder a piston passes, but watertight through the top. A tube leads from the cylinder to a force-pump, and by means of this water is drawn from the tank into a cavity, so as to force the piston upwards. The piston supports a table, on which is placed the paper to be pressed, and the rising of the table presses the mass against a strong crosshead, fastened to the side pillars of the press. The power of the press is calculated in the following manner: Suppose that the pump has only one-thousandth of the area of the piston, and that by means of its lever-handles the piston of the pump is pressed down with a force of 500 pounds, the

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piston of the barrel will rise with a force of one thousand times 500 pounds, or more than 200 tons. The rise, however, is slow in proportion to the power.

The enormous multiplying power given by this machine has been employed for many years in the printer's warehouse, presses suitable for printers being made of various sizes up to quadruple demy, which can be pumped up by steam or hand power. It is found advantageous, when a number of presses are used in an office, to employ steam. An eccentric should be fixed to the shafting. Any number of presses may be supplied by a single pipe, by having a joint at each press fitted with a screw valve, which can be opened or shut at will.

The *Boomer Press* is a comparatively recent invention. The principle by which its enormous power is accumulated is by a combination of four levers working upon toggle joints, through which passes a right and left hand screw. The rotation of the screw causes the two joints to approach or diverge, according to the direction of such rotation, with a perfectly uniform motion.

This press possesses several advantages over both the ordinary screw and the hydraulic presses. The pressure once applied cannot yield, so that the material is in no way released, and can therefore receive a finish in less time than when under hydraulic pressure. The construction is simple and not liable to get out of order. The power accumulates with every turn of the screw, the movement of the platen or "follower" being rapid at the commencement of the pressing, gradually diminishing in speed as the power increases and the material under pressure becomes the most dense. The movement of the follower can be regulated with nicety, being continuous in action, not intermittent, as with the hydraulic. The press is specially adapted for smoothing damp sheets and pressing printed sheets between glazed boards. It often does as much work in two hours as in the screw press would require twenty-four hours.

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CHAPTER II.

HOT-PRESSING PAPER.—Gill's Hot Rolling Machine.

HOT-PRESSING, as a process for finishing sheets by removing the indentations of the printing, and imparting smoothness and glossiness to the paper, is very much superior to cold-pressing. There is also the special advantage connected with its use, that the work is done in considerably less time—a matter occasionally of the highest importance.

On the other hand, unless hot-pressing is properly done, it may spoil instead of improve the appearance of the sheets subjected to it, especially by browning the ink, making it spread, and by causing set-off. Very few printers, indeed, know how to do it efficiently, and the ordinary text-books of printing give no directions that are practically useful. In the Metropolis, the two or three firms that make a special business of it decline to afford information to others as to its *modus operandi*, while very jealously guarding their own plant from the inspection of outsiders. The following details may be depended upon as representing the best methods adopted by the professional hot-pressers.

The Press.—The press that has given the best results hitherto is the hydraulic press, described in the last chapter; though there would seem little reason why the Boomer press should not perform the work equally well. The ordinary screw press, however, is not powerful enough. The chief disadvantage of the hydraulic press is that it "gives" after impression is put on. This, however, only occurs with what is called "spongy" work; that is, soft piles or "stacks" of paper whose compressibility is greater than usual. When the stacks are put in "solid," the pressure is maintained. On a good hydraulic press the average pressure may be about 200 tons.

Arrangement of the Press.—On the bed of the press about twenty glaze boards, or "cards," or "skins," as they are usually termed, are first of all laid down to form

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a firm foundation. Then there is laid on them a heated iron plate, about ½ or ⅝ inch thick. Above that comes the stack, consisting of sheets of the paper alternated or "sandwiched" with glazed boards. About 130 glazed boards form a stack. Above them, again, comes another hot plate, and then, according to the available space, other stacks, a heated plate; twenty or thirty cards being laid on the top of all. The "follower" is now nearly reached, and the action of the pump and piston below the bed forces the latter up, and causes the impression. This filling of the press is called "building up," and it has to be done with the greatest rapidity, otherwise the plates would get cold.

Heating the Plates.—This is done in a specially contrived oven, with a damper at the top, which is opened for the admission of cold air if the plates have become too hot; or, in technical language, are "over-baked." To know whether the plates are hot enough, the workman applies his finger, covered with a little saliva, in the same way as tailors are accustomed to test the temperature of their irons. If the saliva is at once evaporated, the plate is hot enough.

Building up.—The whole of the stacks must be put in the press together, to prevent the plates becoming too cold. They are kept in the press from eight to twelve hours; in the former case it would be called an "eight-hour press," in the latter a "twelve-hour press."

The Boards.—Unless the work is very common, one sheet only is put between each board. The boards should not be too thick; if they are, much of the force of the impression is lost. As is well known, the boards are expensive, but practically they may be said to never wear out. This may seem remarkable, but it is quite true; plenty of boards are now in use in houses doing this kind of work regularly that are thirty and forty years old. Constant wear is apt to make them broken and ragged at the edges; but this is a different thing to wearing them out, to which it would be thought they were especially susceptible.

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Cleaning the Boards.—In the printing-office the operation of cleaning the glazed boards is regarded as being quite as necessary as it is found to be tedious. Yet in a regular hot-presser's establishment the boards are never cleaned at all. Whenever it is thought that there is danger of set-off, the boards are simply "baked," or exposed in the oven for heating the plates, to a moderate heat. The effect of this seems to be to indurate the board with printing ink, which, even with the finest work, never sets off. This has been a trade secret hitherto, and one that has been jealously guarded. Now that those who use the hot-pressing process are in possession of it, the saving that may in this way be effected will no doubt be appreciated. Boards that have been in use a dozen years have the appearance of black polished ebony, through the successive "bakings" and the ink thus ingrained into them; but that no set-off is thereby caused is simply a matter of practical experience. Sometimes they are baked twice, but this is after exceptionally heavy and "wet" ink has been passed through them.

Care should be taken to have the boards well filled up, as if they are unevenly packed, or all the paper is not placed in the centre over the ram, there is great danger of breaking the press.

When Sheets may be Pressed.—The two methods of ascertaining whether the sheets have been sufficiently dried as to allow them to go into the boards already referred to, apply also to hot-pressing. The sheets may be slightly rubbed with the finger, and if there is a smear resulting they are not yet fit. Or a piece of paper may be applied to a portion and rubbed with a paper-knife; if there is any ink adhering to the white paper, in the shape of set-off, the print is too wet.

Filling in.—The boards may be filled in with sheets in the way already referred to under the subject of Cold Pressing. There is, however, a much more rapid plan, adopted in the large hot-pressing establishments, which may be here described. The boards are emptied of their last jobs and filled in with new work simultaneously. The workman stands with a pile of printed sheets at his left

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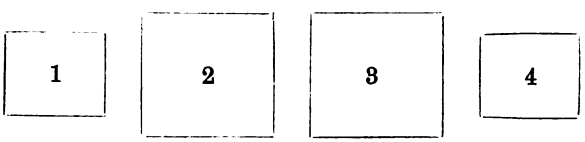
hand, a pile of boards at his right hand, and a vacant space in the middle. He "fans out" the boards, and does the same to the sheets, so that they may the more readily be picked up. Of course the sheets are fanned towards the right by the use of the left hand, the direction of the fanning of the others being opposite. Now, with his right hand, he takes a board and places it in the space between the piles of sheets and boards. Then, with his left hand, he takes a sheet and places it in the centre of the board. Then, with the right hand, he places another board on the sheet; afterwards another sheet, and so on to the end, or until a stack of about 150 boards has been reached. By careful practice, remarkable rapidity and precision may be attained in this operation.

Let us now suppose that we have on the left hand a pile of work that has to go into the press, and on the right a stack that has just come out of the press, consisting of boards and sheets. Taking out each sheet singly, lift the board with the right hand, and place it on the right-hand side of the stack. In the same way, with the left hand, take the sheet off the stack, and place it on the left of the stack, and so on. In the result the boards will, of course, be empty again.

The method used when two boys are employed is that one is always emptying a stack of pressed work while the other is always filling in the boards. The following diagram of the arrangement of the table or bench may explain this:—



1. Pile of impressed sheets to go into boards.
2. Stack of boards and sheets to go into the press.
3. Stack of boards and sheets taken out of the press.
4. Pile of sheets taken out of No. 3.

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While one boy is taking the sheet from No. 3 and placing it on 4, the other picks up the board and lays it down on 2. Meanwhile, a sheet from 1 has been transferred to 2, and a board belonging to 3 released through the pressed sheet it contained going to 4. This board is laid on 2, while another sheet is being lifted off 3, and another board made available.

The Gill Hot-Rolling Machine.—The speciality of this machine is that by means of it work may be finished directly after it is taken from the machine, the drying and pressing or "rolling" the sheet being done at one operation.

The machine consists of two polished steel cylinders, through the centre of which a small steam-pipe passes. At the upper end is a feeding-board, on which the work is laid, and at the other end, under the cylinder, is a delivery arrangement somewhat like the flyers of a printing machine. The machine can be set up by any engineer, as all the parts are carefully marked.

After the machine is erected, and before commencing to run paper through, care should be taken to ascertain that the points for removing the sheets from the rolls are set so that each point touches the roll. The machine may then be started, and the points worked up to a feather edge. When this is done there will be a slight burr on the ends of the points, which must be removed by means of a little emery-cloth on the fingers. Then remove the bolts, which go through levers at ends of point bars, and by which the points are pressed against the rolls, and substitute for them the elastic bands sent with the machine, as, after once being bedded, the points must only be pressed against the rolls with a light elastic pressure, otherwise they will have burrs produced on them, which will stop the delivery of the sheet.

If it should be found that sheets occasionally catch the points, it will be evident that some of the points have not been sufficiently bedded, or the burrs have not been thoroughly removed, and they must be allowed to work a little longer before passing any more sheets through.

The solution for removing the set off from the rolls

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consists of common soda and water, in the proportions of one pound of soda to one gallon of water, and the solution is ready for use after standing about ten hours. If the ink is very greasy, a stronger solution may be necessary. The addition of a little of "Hudson's Dry Soap," or, better still, Powell's "Kathartikon," is found beneficial in keeping the rolls bright.

When the machine is working constantly, the sponge-bags in the troughs must be turned at least twice a day, and thoroughly washed once a week; or a piece of old blanket should be placed on the top of the sponge-bags and washed every night. The troughs should be emptied and thoroughly cleansed at least once a month.

When the machine is stopped for any length of time, say all night, the troughs containing the solution must be taken out, and the pressure removed, so that the rolls are not in contact. The rolls should be cleaned thoroughly dry, and wiped over with a greasy cloth, or a little mutton suet, so as to prevent any corrosion or rust, to which chilled rolls are especially liable. This is most important, as the rusting of the rolls will necessitate their being taken out and re-ground, which is a very costly process.

When careless workmen are employed, the printed work is sometimes injured by the ink being caused to spread. This is owing to the rolls being too hot; for best cut-work the temperature of the hand must not be exceeded.

Paper may be thinned by this machine to an extent that is quite surprising. The "London Post Office Directory" was thus reduced in thickness about one and a half inches.

If the rolls are too hot, the Gill machine will render black ink slightly brown. This result is also met with in ordinary hot-pressing if the plates are too hot. It is advisable not to roll immediately after printing, as the machine in such case necessarily takes some of the colour off. If the ink is allowed to set, there is no tendency of the kind. With a little experience and care any workman will be able to roll all sorts of work satisfactorily.

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The machines will roll anything, from a trade card to a quadruple demy sheet, with cuts or otherwise. As much as 200 reams of double-crown and demy sized sheets have been rolled on a 33-inch machine in an ordinary week. The machines are shown to have saved one London firm alone £500 a year, comparing the cost of rolling with that of drying and pressing.

CHAPTER III.

Folding—Knocking-up—Gathering—Collating—Counting—Cutting.

Folding.—If the sheets in hand consist of bookwork, they are now ready for folding. This is done either by hand or machine.

Machine-folding requires no directions. The sheets are fed into the apparatus as in a printing machine, receive their folds from the mechanism inside, and are delivered at the bottom, all that is necessary being to remove them whenever the pile has become sufficiently large. Some machines register by points as in printing, in others the work is merely fed up to gauges. The alteration of the apparatus for two, three, or more folds is done according to the directions for use supplied by each manufacturer, which are applicable only to his particular machine; hence it is unnecessary to reprint them here. Care should be enjoined upon the operator, usually a young woman, that her hands are clean, and that the sheets be as little handled as possible, lest smears be caused.

Hand-folding is an operation requiring both precision and dexterity, qualities of a somewhat diverse character. The operator must fully understand the object and uses of signatures, as described in Chapter XV. of the First Part of this work. There is a different method adopted for each form of sheet, the quarto, octavo, twelvemo, and the rest, each requiring special treatment. The general system, however,

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may be gathered from the following account of the folding of an *octavo* sheet :—

Take a pile of about a ream and lay them out flat on the folding-board. If any of the sheets are irregularly piled up they must be brought to lie exactly on the top of each other by being knocked-up, which will be described hereafter. It is most essential for proper folding that the pile should be perfectly straight and square.

Now turn it so that the *inner* forme is uppermost—that is, the side containing the second page of the sheet. The principal signature will be underneath ; but the secondary signature, such as B 2 of sheet B, will be exposed to view, and be on the extreme right hand. The order of the *printed* pages will now be as follows :—

7	10	11	9
2	15	14	3

At the foot of 3 will be the second signature. Now fold the half of the sheet containing pages 3 and 14 entirely over the other half, and stroke down the line of the fold. It may be that the off-margins of pages 2 and 3 are not exactly equal, but that must be disregarded, and the pages of the print themselves made to fall exactly over each other. The following pages will now be uppermost :—

5	12
4	13

Bring that half of the sheet containing 5 and 12 over, upon

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the top of 4 and 13, and stroke the fold. Now there is presented only pages

8	9

Fold 9 over 8, and page 16 will be exposed, the folding being now finished. With the left hand remove the sheet to the left side, and commence folding the next.

The right hand should be used for turning the sheet and stroking down. The adjustment of the pages, or making them register, is done with the left hand immediately before stroking. The sheets ought to be well flattened, or they will give subsequent trouble, and it is advisable to have large pieces of wood on the folding-table to keep the pile straight.

Knocking-up is a simple operation, yet somewhat difficult to describe verbally. Its object is to get the sheets lying exactly on the top of each other in an even pile—in non-technical language, making all the edges coincide. Take up twenty or more loosely between the two hands; place them on edge, lift the lot up and bring down smartly on the board; by which the bottoms of all will be made regular and even. Then, without disturbing their position in that direction, turn round the lot and bring the other edge against the table. This will probably bring the whole pile right; if not, it must be turned again until all the refractory sheets have assumed their proper places.

Although properly appertaining to Bookbinding, the two operations of *Gathering* and *Collating* may be briefly described.

The several sheets of a volume having been folded, and otherwise finished, have now to be brought together in due order and sequence. Each signature is laid out in a pile on the board of the warehouse, and the gatherer begins with taking a sheet of the first signature, then one of the second, third, and so on till all have been exhausted. It does not always happen that the stock of printed sheets "runs level"—there will generally be a few more of some

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sheets than others. The actual number of books is, of course, the number of complete sets of sheets that can be gathered. All sheets remaining are designated as waste.

Howe's Rotary Gatherer is an arrangement for economising space and labour. The various piles of printed sheets, arranged in order according to signatures, are placed on a circular revolving table. The person gathering has merely to stand still in his place, and each pile will be successively presented to him. He takes one sheet from each, and places it on a fixed table at his side. Two or more persons may simultaneously gather at one machine, as the piles will pass each of them in succession.

Collating, is simply examining each set of sheets to ascertain whether it includes one copy, and only one, of each signature, and that all the sheets comprised in it are in proper order. The operator takes up the lot by one corner in his left hand, by which means the sheets are slightly separated and the signatures exposed. He runs his eye over them, and instantaneously detects any inaccuracy.

Counting, as we have already said, is one of the most frequent operations in the warehouse, and it is of the greatest advantage to be able to do it properly—that is, methodically, rapidly, and accurately. The process is very simple, yet difficult to describe; and the best way to learn it is to watch some experienced hand. A sufficient quantity of sheets—which practice alone can indicate—are taken in the right hand; then, by a dexterous turn of the wrist, they are separated fan-wise, so that the edges of each are distinctly seen. The left hand is laid on the top corner, a certain number of sheets are counted by a glance of the eye, and the left thumb introduced. The hand is now advanced so as to keep this portion a little back, while another portion is counted and the thumb introduced, and so on. The rapidity with which this is done by an expert seems marvellous to the inexperienced. The thumb seems mechanically to travel through the successive portions, and there appears to be no mental calculation at all on the part of the operator. The only directions we need give on this subject are, not to attempt to count by too many numbers

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—five being the most convenient portion—and that the workman should accustom himself always to count by the same number.

Cutting is done by hand and by machine. By hand the process is quite simple, and, indeed, understood by nearly every one. To do the work really well, however, requires care and practice. The paper must be carefully folded down and smoothed with the paper-knife; a proper cutting-knife well sharpened must be used, and the cut given firmly and continuously; otherwise the paper will be "saw-edged," and require to be trimmed.

Cutting at the machine is also a simple operation, requiring little instruction. The ordinary guillotine cutting machine has a table on which the paper is laid. The pile is then pressed back so as to come under the knife, being kept in position and supported at its back by a kind of clamp, worked by a handle underneath the table. It serves also to ensure a square shape to the paper. The clamp is then brought down by the gearing provided for the purpose, and finally the handle is turned and the knife descends. When it has made the cut, the wheel is stopped, and the handle re-ascends automatically. Some machines are self-clamping, and require less attention than others. The process, indeed, may be learned in a few minutes by watching a practised hand.

Finally the sheets are parcelled up and warehoused, or sent away to the customer. The contents of each parcel should be legibly written upon it, and it must be carefully tied up with string. If it is to be kept in the establishment, it should be removed to a suitable, cleanly, and accessible place, where it can be obtained when required with the least amount of trouble.

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PART FIFTH.

A GENERAL VIEW OF THE SEVERAL DEPARTMENTS OF A LARGE PRINTING-OFFICE.

To present a general view of the complete economy of a Printing-office, and to show the relationship of its different departments to each other, we might begin with the *Counting House*, and describe the system adopted for keeping the accounts. This, however, does not necessarily differ from that in use in other manufacturing or trading establishments, and we need not occupy space in more particularly referring to it. It may be useful to remark, notwithstanding, that a great portion of the accounts of a printing-office must be made up in the different workrooms. It is advisable to have a printed form, with blank spaces to be filled up. It should include the following items, being those that are most likely to arise :—

MEMORANDUM OF CHARGES.

No..... Job Received.....188

	H.	M.	COST. £	s.	d.	CHARGED. £	s.	d.
Paper (or Cards)...								
Composition (day)								
,, (night)...								
Distribution...								
Reading								
Corrections								
Author's Corrections...								
Proof pulling								
Imposing								
Re-imposing								
Ruling								
Paging								
Binding								
Preparing Stereo								
Stereo								
Metal								
Machine (.....)								
,, (.....)								
,, (.....)								
,, (.....)								
Ink (black)								
,, (coloured)								
Bronze								
Dusting...								
Folding...								
Cutting and Booking								
TOTAL								

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This form should be attached to a specimen sheet of each job, and the two filed together. The amount of the composition and corrections—that is, author's corrections—is made up by the overseer, who goes through the compositors' bill-books, and debits each job with the several items belonging to it. The amount for reading is generally estimated, for as a rule readers do not keep an account of their time. The "working off" lines—that is, the cost of press-work or machine-work—is obtained from the overseer of the press or machine room; that for pressing, warehousing, or paper, is obtained from the warehouse. When all the items are added up, a certain percentage of profit is added on by the principals, or some experienced person, the latter usually being known as "the printer's clerk." He should have a practical knowledge of the different departments of the business, in addition to being a ready and correct computer.

The Warehouse.—The operations carried on in the warehouse are many and important. Here will be done the "warehousing" of the paper, both white (or unprinted) and printed. If there are periodicals or serials printed in the establishment, the warehouseman has to take an account of the state of the stock, and as far as possible to "keep it level"—*i.e.*, to see that there are not large numbers of some sheets and few or none of others. When stock gets low, he has to report the fact to the firm, for them (or the publisher) to decide whether reprints are necessary. As custodian of the white paper he has a very responsible task. He must check the bills of the stationers and see that the proper number of reams debited to the firm are really received. He must also superintend the wetting down of the paper, for he may have careless or inexperienced men under him, who may spoil many pounds' worth of paper by their negligence or incompetence. In establishments where binding is done, the warehouseman also has control of the girls, who fold, count, collate, and sew or stitch the printed sheets. All printed matter leaving the printing-office should invariably go through the warehouse, and a strict record of every transaction ought to be kept by some appointed person. Although the wages of the workpeople

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in this department are generally small compared with those given in the composing and press departments, the chief warehouseman is well paid, as the responsible nature of his duties deserves; about £3 per week is an average salary in a first-class house.

In the warehouse are kept the cutting, perforating, paging, and similar machines, as well as the hydraulic presses. The strictest cleanliness ought to be maintained throughout this department, dust especially being avoided as much as possible. In too many cases the warehouse is situated in a cellar or in an outhouse; but this is a mistake. There is no part of the establishment more urgently requiring a good light, free circulation of air, and abundant room. In several of the new offices in London, the warehouse is situated on an upper floor, which is a judicious arrangement, but it necessitates the use of a good hoist or lift. The latter should be entirely distinct from that used for moving formes about.

Besides the warehouseman and his assistants, there are the girls and the errand-boys. It is well to despatch all letters, proofs, &c., that have to be delivered by hand, through the warehouse, and to keep the errand-boys entirely in that department.

The Press Department.—The press-room is superintended by the press overseer, and he is assisted by the pressmen. He keeps an account of the working of each press under his control, and fills up the bills with the amount of expense that has been incurred on each job.

The press overseer has, to a great extent, to regulate the amount of wages of those employed in his room. Pressmen have no fixed scale of charges, and most of the jobs are paid for according to special arrangement. Some jobs pay 7d. and others 10d. a token, and it depends usually upon the press overseer at which sum the job is charged.

The overseer, in most cases, has to do with the buying in of supplies, such as ink, parchment for tympans, rollers, &c. The latter are often supplied by contract, a "quarterage" being in operation, and the office gets its rollers cast whenever it is deemed desirable that they

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should be renewed. A careful overseer not working under such an arrangement will save his firm a large sum in the matter of rollers alone in the course of a year, while in such things as ink, turpentine, lye, the saving that can be made by a competent man is quite remarkable.

When reprints of fine cuts are required, it is now usual for the publisher to require the overlays to be returned with the block; and if the work has to be sent to another office, it is expected that the ready-made overlays will be allowed for in the cost of the press-work. These overlays should be made up in large envelopes, with their descriptions legibly written outside, and they should be in the care of the overseer.

The pressmen are expected to submit a copy or proof of each job to the overseer, in order that he may approve or pass it. In many cases he preserves this sheet himself, in order that he may have a check upon the work being kept up to the required colour. In some offices this sheet is sent up to "the closet" for approval, and the work is not allowed to proceed until such approval is signified.

If there are apprentices in the press-room, they are often indentured, not to the firm, but to the press overseer, and he generally participates in any premium that may be received with them. The term of apprenticeship is the same as in the composing department. Boys are now, however, seldom apprenticed for the whole term to press; for a certain proportion of their time they are expected to learn machine-work.

Machine Room.—In large offices the machine overseer is the head of the printing department, and the press overseer is subordinate to him. He has under him the machinists—the journeymen who superintend the particular machines, and the boys who lay on and take off. Machine-minders, as they are called, simply see to the making ready of the formes and to the proper working of the machines, and do not either feed or take off. If there is an engineer's shop attached to the office, repairs will be done there, and any accidents that happen will be rectified by the mechanics who attend exclusively to that depart-

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ment. In the great majority of offices, the machine-minder is expected to be able to make slight repairs, such, for instance, as can be done at an ordinary bench, with the aid of files, vice, hammers, &c.

The machine overseer is called upon to see a proof of all the work done in his department, and is responsible to the firm for its proper quality. He engages the different workpeople who are under him, and is expected to maintain due order in each branch of his department.

One of the most important of the machine overseer's duties is the keeping of an account of the performances of each machine. This is known as the "reamage," and is carefully scrutinised once a week by the general manager. If the production of any one machine falls below what is expected of it, the overseer is called upon for an explanation. In most of the large offices the number of reams turned out in a week is regarded as a criterion of the capabilities of the overseer. It is his interest, therefore, not only to keep the whole of the machinery in the best order, the whole of his assistants in the best state of discipline, but to look out for a constant succession of work, in order that no machine may long remain idle. This is especially important from the fact that, unlike the hands in the composing-room and the press-room, who are very often engaged "on piece," machine hands are nearly always "on 'stab.," and any lost time that they make is debited to the machine-room.

The functionary generally known as the press reviser usually has his closet in or adjoining to the machine-room. He is expected to give every job a final revision, and the time allotted to him is usually that which is occupied by the machine-minder in making ready. It is often surprising to see the errors that an entire series of readers will allow to pass, and which the press reviser is expected at once to pounce upon. He should not trouble himself much about the textual accuracy of the work. The headlines, folios, dates, margin, succession of the pages, and such-like are what chiefly concern him. If an error at any time afterwards be discovered he may require

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the machine to be stopped, and the compositors to make the rectification. The machine hands do not touch the types; if there is even such a slight accident as a "batter" the compositors are called down and expected to make it right. Of course, only compositors on "the 'stab." are expected to leave their frames for this purpose.

The care of the rollers, the ink, and the washing of formes comes within the province of the machine overseer, and he is responsible to the firm for their due discharge.

The wages of machine overseers are very high; often higher than those of the general overseer of the establishment. From £5 to £8 per week is an ordinary rate of remuneration. The position is one of such responsibility, and requires for its proper discharge such wide knowledge, extended experience, and constant steadiness, that a good salary is well deserved.

The Reading Department.—This is known under the general name of "the closet," although in some offices the principal only is referred to in these terms. There is one head-reader, who is sometimes the "press" reader, and the remainder of the correctors are known as merely first-proof readers. A full description of their duties has already been given. The wages of an ordinary reader are about £2 per week. Classical readers get about £3, and a head-reader about £4 or £5. Considering the character of the work done in this department of a printing-office, the salaries are certainly not adequate, but the rate is owing to the vicious system adopted in many of the "pushing" houses of not making any charge whatever for reading. Each reader has his reading-boy, generally in training for apprenticeship. The head reader or the firm, however, engages and discharges these boys.

In some offices the head-reader is made responsible to the composing-room overseer, and receives the proofs direct from him, giving them out to the various correctors as may be necessary. This is not a desirable arrangement, for it is always best to have the reading department independent of any other, and amenable directly to the principal or the general manager.

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The Storekeeper's Department.—This is under the entire control of the storekeeper, who is usually a compositor. He receives all the type brought into the office, is responsible for keeping it in proper order, and has to give out the cases of type, the leads, rules, sorts, &c., to the compositors as required. His chief qualifications are, besides honesty, a faculty for keeping everything in its place and being able at any time to produce whatever kind of material he may have under his care. He should keep an account of everything that leaves his department, and the name of the workman to whom he entrusts anything.

In offices where large numbers of stereo and electro plates are stored up, one person is made responsible for the whole. He has to keep a list of the nature of every plate, to whom it belongs, when it was last used, &c. As many thousands of pounds' worth of these things are kept in some establishments, this position is also a very responsible one. If his time is not fully occupied, he is expected to assist in repairing broken plates, and generally to make himself useful in his own department.

The Pickers are those who have the work of touching up electros and stereos as they come from the foundry. They are men who, as a rule, have been brought up as wood-engravers, and are required to possess at least some artistic ability. This branch of the printing business is much more carefully attended to in America than in England, and the result is seen in the greater superiority of their blocks, especially those produced by the automatic processes.

The Composing Department includes the overseer and the journeymen compositors. There is the quoin-drawer overseer, a subordinate of the general overseer. The other persons are divided into clickers and line hands. In some offices there are special "makers-up," who have to do all the imposing. In regard to their internal organisation, there are the Father of the Chapel, the Stewards, and the Clerk. The men are at work either "on piece" or "on 'stab.," but piece hands are occasionally called upon to work "on time." All of these terms will be found described in the main body of this work.

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In some establishments the *Apprentices* have a separate composing-room to themselves, but generally they work along with the journeymen. Apprentices are of two kinds, indoor and outdoor. The former are sometimes called "house apprentices," because they have dwelling apartments provided for them by the firm, and indeed are supposed to live with their employers.

Apprentices are usually paid a small progressive salary for the first two or three years of their term, and are then "put on the piece," that is to say, they get a certain proportion of their earnings, calculated in the same way as a journeyman's earnings would be computed. One-half or two-thirds is an ordinary proportion. The employer should, for his own benefit as well as that of his apprentices, see that they make enough money in the week. Their earnings are a test of their ability and industry, and when the "bill" they write at the end of the week is a small one, some explanation should be called for.

The Closet.—Understood as consisting of the employer and his overseer or manager. This is the most important department in the whole establishment—the heart, in fact, of the entire organisation. It is the closet that controls and animates all the other departments, and that furnishes the motive-power by which the machine is kept going.

One serious danger threatens the printing business in the present day. It is becoming more and more the practice to leave the superintendence of large establishments entirely in the hands of managers and overseers. In many cases the proprietor seldom visits any portion of his office except the counting-house, and is personally, almost entirely, unknown to the people he employs.

Things were different formerly. The memoirs of such men as Bulmer, Hansard, Bowyer, and Nichols show how affectionately, and even paternally—with what solicitude for the welfare of their employés—those great old printers governed their establishments. They knew everybody engaged, and personally assured themselves as to the characters and capabilities of each individual. Nowadays the employer is often merely a capitalist. He may

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not have been trained to the business; if he has, perhaps, he now completely disassociates himself from it. Duties that in the olden time would be conscientiously discharged in person are discharged by deputy; and to that fact may be attributed not a few of the evils which we see springing up around us—insubordination on the part of juniors; want of principle and conscientiousness on the part of the seniors; disregard of the rights and interests of others; duty discharged merely perfunctorily; the belief that "anything will do," provided its deficiencies are not found out.

There is no practical remedy for this, which amounts to a dereliction of duty on the part of employers. Men who own offices cannot be compelled to do more than to pay the customary wages for work done, and to conform to the sanitary and other laws bearing upon their own in common with all other industrial establishments. But we do trust that, should this book fall into the hands of any one who is about to commence business on his own account, he will not forget some of the most valuable lessons which he must of necessity have been taught during his apprenticeship and during the time he has worked as a journeyman. We trust that he will cultivate, in his new capacity, the sentiments of fellowship and brotherly regard which happily exist among the working members of the craft—the sentiments, in fact, which the old guilds ever sought to maintain. Even the little interior organisations of the trade—such as the chapel, with its "father" at its head; and the "companionship," with its copartnery and community of interests among those who belong to it—imply a closer bond of union between working printers than exist in the ranks of other mechanical callings. It is grievous to see these feelings often so utterly ignored when men have passed on to become employers themselves. Asperities engendered by the keen competition that now prevails, irritation and anxieties arising from a most exacting position, may palliate, but do not extenuate the neglect of responsibilities and the non-observance of some of the amenities of ordinary business life. Those who have committed to them the control of young people destined for the craft should feel it their bounden duty to

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impress upon them the nobility and the dignity of their calling, and the duty of maintaining the traditions of its ancient professors—men who gloried in and magnified their art, and recognised the inestimably beneficent influence it has exerted upon civilisation, learning, and religion—men who felt that it was incumbent upon them, as professors of that art, to abhor all that was mean or unworthy, selfish or untrue.

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APPENDIX.

BOOK-KEEPING FOR PRINTERS:

By A. POWELL.

BOOK-KEEPING is a necessary outcome of the complicated relations of civilised life, and of the nature of modern trading. When men bartered goods for goods, or sold them for ready money, there was little need to record the transaction. Nor is there now any necessity for book-keeping on the part of a labourer who values his day's work at a certain sum, and receives that sum for it. But when credit is given or taken, or when the thing produced is the outcome of several men's labour, or of the use of machinery, it becomes advisable—nay, often quite necessary—to have a proper system of reckoning up the cost, and of comparing the expenses of the establishment with the revenue derived from it. Book-keeping, then, arose almost simultaneously with the manufacturing and commercial systems, crude at first, but gradually improved, until now it may be said to be an almost perfect art.

The book-keeping necessary for a printer is, and must be, somewhat extensive and complex. The reason is that his is a manufacturing business, and that he has to calculate the cost of the goods he sells, or of the work he does, by adding together many items of divers natures, whereas the ordinary shopkeeper has the information ready to his hand in the

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invoices of the manufacturer or warehouseman of whom he buys his stock. The stationer who sells a five-quire packet of note-paper for a shilling knows that he makes a profit of fourpence on the transaction, because he paid the wholesale stationer for that same packet the sum of eightpence; but the printer who contracts to supply ten thousand handbills for fifteen shillings cannot tell whether he will make a profit or loss on the job until he has estimated the time the composition, reading, correcting, machining, and warehousing will take, the cost of the paper and ink used, the wear and tear of type, machinery, and material, and the sums, if any, which he will have to spend on electros, stereos, or other such things in order to produce the work required. It is so with all manufacturing businesses, and it is no use for the printer to grumble that he is obliged to adopt a much more complicated system of book-keeping than his friend the grocer, who turns over, perhaps, twice as much money in the course of a year. He must, in fact, keep the same kind of accounts as the grocer, and a good many others besides.

It is no part of our business to teach the elements of general book-keeping, or why certain items have to be posted to the right-hand side of the ledger, while others are entered on the left-hand side. Such information can be learned from any of the works on book-keeping already published, one of the best of which is that of Hamilton and Ball, published by the Clarendon Press, Oxford (London: H. Frowde, Paternoster Row), at the reasonable price of two shillings. The learner is strongly advised to get this book.

We will now enumerate the books the printer ought to keep. They are: 1, a *Ledger;* 2, a *Cash Book;* 3, a *Bought Journal;* 4, an *Order Book;* 5, a *Cost Book;* 6, a *Day Book.* He will also find it very useful to have printed *Dockets* of kinds to be specified.

The Ledger.

This book is familiar to everyone. It contains the accounts of all persons with whom the firm has dealings, and each account has a debtor and a creditor side. Thus, if the firm sells goods on credit to John Smith, there must be an account in the ledger headed "John Smith," and on the left hand, or debtor side, must be entered "To goods (say), £4 12*s.* 6*d.*" When Smith pays, the sum received must be entered on the credit side of his account, and if he is allowed any discount, that must also be entered on the same side. We will suppose Smith pays £4 8*s.*, and is allowed 4*s.* 6*d.*

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discount. We shall enter in his account (after placing the amounts in the cash book) these sums :—

	£	s.	d.
By Cash	4	8	0
„ Discount	0	4	6

and by adding it will be seen that both sides of the account are alike, or that the account "balances." It can therefore be ruled off, *i.e.*, double lines may be drawn under the totals of £4 12*s.* 6*d.* on each side of the account.

Again, if the firm buys goods on credit, it is necessary to open a similar account for the person from whom the purchase is made, and on the credit side of this account must be entered the amount of the goods so bought. The cash paid for them will be entered on the other, or debit side, and so will any discount allowed to the firm. Accounts with persons or firms are called "Personal Accounts." Many tradesmen keep this kind of accounts only, and these certainly show how they stand with regard to those with whom they have dealings ; but if they desire to know how their business stands with regard to themselves, and how much they gain or lose by it, they must keep in their ledger another kind of accounts, called "Impersonal Accounts."

We have said printing is a manufacturing business, and that, therefore, a somewhat complicated system of impersonal accounts is necessary.

One of the chief things necessary to be known by the book-keeper in such a business is the distinction between capital and revenue, or in other words, what items should be posted to the Profit and Loss account and what should not. Ignorance on this point leads to erroneous and often disastrous results. On the one hand, it is possible for a man to imagine his business far less remunerative than it really is, and on the other the proprietor of an establishment may think himself prosperous while all the time he may be faring very indifferently. The second error is, indeed, by far the more common, as it is certainly the more dangerous; the items omitted almost always belong to the debit or loss side of the revenue account, and they may be forgotten without any breach of faith on the part of a man to whom the proper principles of account-keeping are unknown.

To guard against errors of this sort, it is necessary to keep separate accounts of the leading items of expenditure. Accounts should be opened in the ledger under each of the following heads :—1. Buildings. 2. Rent, rates, and taxes.

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3. Machinery and standing plant. 4. Type. 5. Brass rule, leads, and furniture. 6. Consumable material. 7. Wages. 8. Goods. 9. Casual expenses.

Buildings Account.—This account is necessary only when part of the capital of the proprietor is expended in the erection or purchase of freehold or leasehold premises. The amount so expended is to be entered on the debit side of the account. In the case of leaseholds, a sum must every year be written off for depreciation—that is to say, an amount must be entered on the credit side of the account and a corresponding amount entered on the debit side of the Profit and Loss account. The amount of this depreciation will depend on the length of the lease. For instance, suppose a premium of £500 has been paid for a lease having 15 years to run; it is obvious that this sum will be wholly sunk at the end of the 15 years, and so a sum of £33 6*s.* 8*d.* must be written off every year in respect of this depreciation. Sums spent on repairs must be entered on the debit side of the account, and an annual sum equivalent to the average yearly cost of such repairs written off and carried to the Profit and Loss account. The Buildings account will never be closed, and the balance of it will form an asset in the firm's balance sheet.

Rent, Rates, and Taxes Account.—The name of this account explains what it is. Gas and water rates may be entered here as well as rates and taxes properly so called. In it, on the debit side, must be entered each quarter's rent and each instalment of rate as it becomes due, the same items being also entered to the credit of the accounts of the several bodies to whom they are payable; or if it is the invariable custom to pay rent and taxes as soon as they are due, the cash so paid may be posted direct from the cash-book into the Rent and Taxes account (debit side), and thus no accounts need be opened to the landlord and the various creditors for rates. If any part of the premises is let off to tenants, the amount of the rent payable by them is posted to the credit side of the Rent account. The balance of the account is transferred every year to the debit side of the Profits and Loss account.

Machinery and Standing Plant.—This account is kept in the same manner as the Buildings account. The cost of all machinery and standing plant is entered on the debit side of the ledger, and every year a certain sum is written off for depreciation. Seven per cent. on the prime cost is a reasonable proportion to write off annually. By standing plant is

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meant frames, cases, racks, imposing surfaces, chases, galleys, and the like. The cost of repairs will go into the Casual Expenses account.

The accounts of *Type* and *Brass Rule, Leads, and Furniture* are kept in the same manner, the only difference being in the amount to be written off annually for depreciation. On type of course it varies according to the wear it has. There are some very heavy jobs which require a new fount of type every ten or twelve months, while, on the other hand, in some small country offices type will last half a lifetime. In offices where a good amount of business is done, and the type is generally in use, 12 per cent. on the cost is a fair proportion to write off every year. A proper record should be kept of every fount of type, so that the owner may know when he purchased it, and of whom. This is of great use when sorts are wanted, but it also enables him to know at what sum each fount stands valued at any time, Suppose a printer having a fount of nonpariel which cost him when new, seven years ago, 2*s.* 3*d.* per lb. net, sells it to his typefounder for old metal, and thus gets 3*d.* per lb. for it. How will he record this transaction in his ledger, and what entries must he make? If he has written off 12 per cent. per annum (or 84 per cent. for the seven years), his fount will stand in the Type account at the value of about 4¼*d.* per lb. The difference between this and 3*d.* per lb. must be transferred to the Profit and Loss account, *i.e.*, entered on the credit side of the Type account and on the debit side of the Profit and Loss account, and the 3*d.* per lb. allowed by the typefounder will be entered to the debit of the Typefounder's account and to the credit of the Type account. In this way the whole value of the fount will have been accounted for. Note should also be made in the Type account that the fount has been sold, and on future occasions the prime cost of the type must be deducted from the sum on which the depreciation is to be calculated.

As regards brass rule, leads, and furniture, these are much shorter lived than type. They are cut up, lost, thrown into the pi-box, and generally wasted. It may be taken as a rule for most offices that very little remains of them five years after purchase, and therefore 20 per cent. on the cost is a proper sum to write off annually.

By some firms type, brass rule, and leads are treated together. This is done in a large London house that we are acquainted with, 15 per cent. on the whole being written off yearly.

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Consumable Material.—To the debit of this account is posted the cost of such things as coal, paper, ink, oil, roller composition, &c. This account requires to be treated differently. At the end of the year stock must be taken of all these things, and the value of those on hand must be entered on the credit side of the account. The balance is transferred to Profit and Loss in the same way as that pointed out above, and the amount of the stock on hand is brought down on the debit side like the balance of an ordinary account.

In very large establishments *warehouse books* are kept, recording all the paper, ink, &c., bought and used. In every printing office, large or small, it is desirable to keep a "paper ledger." This is a book in which a separate folio is devoted to each kind of paper. On the left hand, or debit side, is entered every ream of paper received of the kind mentioned at the top of the page (the value of it per ream is entered, but the amounts are not extended, for in the place of pounds, shillings, and pence, we have reams and sheets); on the right hand, or credit side, is entered all the paper of the kind used; the balance shows the quantity in hand.

The *Wages and Casual Expenses* accounts are sufficiently explained by their titles. The sums paid are, of course, entered on the debit side.

The *Goods* account will comprise things bought for the purpose of the business and the value of work done for the firm by others; such, for instance, as woodcuts, electros and stereos, the cost of machining formes, of binding, and so forth. These and other purchases will be entered on the debit side. To the credit side will be posted the amount of the work done by the firm and charged to customers, as per the day-book.

All these accounts, which, as we have said, are called "Impersonal accounts," may be entered in the general ledger of the concern; but if the business be of any magnitude, it will be found best to have a separate ledger for them, and to enter in the general ledger the personal accounts only, *i.e.*, the accounts of persons or firms by or to whom money is payable.

The Cash Book.

The nature of this book is also well known to almost every one. It generally has one money column and a date column on each page, with a blank space between for particulars of the entries. The receipts are entered on the left-hand pages, and the payments on the right-hand pages. When items

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are "posted" in the ledger, the receipts are entered on the right-hand or credit sides of the accounts in that book, and the payments on the left-hand, or debit sides.

Instead of having only one money column on each page, it is better to have three, thus:

Dr. CASH.

1884.				£	s.	d.	£	s.	d.	£	s.	d.
Jan.	1	Balance	...	...	...	...	5	3	6	221	4	10
	2	Smith, John ...	18	...	4	6	...	...	...	4	8	...
	,,	Jones, H.... ...	50	...	...	...	...	16	6	...	...	...
	3	Office Cheque...	×	...	...	...	15	...	...	...	...	...
		Bill Receivable	501	...	...	...	...	...	...	30	...	...
				...	4	6	21	...	...	255	12	10

CASH. Cr.

1884.				£	s.	d.	£	s.	d.	£	s.	d.
Jan.	3	Brown, H. ...	1	1	10	...	...	...	...	15	...	...
	,,	Jones & Co. ...	4	...	...	...	...	18	...	...	...	...
	,,	Office Cheque...	×	...	...	...	...	...	...	15	...	...
		Acceptance, No. 7 ...	507	...	...	...	...	...	...	20	...	...
	,,	Wages	600	...	...	...	14	10	...	...	...	...
				1	10	...	15	8	...	50	...	...
		Balance		...	...	...	5	12	...	205	12	10
				1	10	...	21	...	...	255	12	10

The two accounts shown above would be on the same "opening" in the Cash Book—the upper one on the left-hand page, and the lower on the right hand. We have been obliged to divide them because our measure is not wide enough to show both in their proper positions; they will, however, be equally well understood.

The first of the three money columns on the left-hand page (which we will call Column No. 1) is for discounts allowed

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by the firm. Thus "John Smith" is supposed to have paid £4 8*s.* 0*d.*, and to have been allowed a discount of 4*s.* 6*d.* (see Ledger).

In the second column (Col. No. 2) are to be entered sums of money received and not paid into the bank.

The third column (Col. No. 3) is reserved for sums received and paid by the firm into its account with its bankers.

The first money column on the right-hand page (we will call it No. 4) is for discounts allowed to the firm. Thus it is supposed to have paid H. Brown £15 in settlement of his account of £16 10*s.* 0*d.*: the discount, £1 10*s.* 0*d.*, is entered in Col. No. 4.

The second column on the right-hand side (Col. No. 5) is for payments made out of the office till.

The third column on the same side (Col. No. 6) is for payments made by cheque, or. otherwise by the firm's bankers.

The specimen entries given explain themselves, except perhaps these:

"Balance, £5 3*s.* 6*d.*—£221 4*s.* 10*d.*"

The £5 3*s.* 6*d.* shows the balance in the till, the £221 4*s.* 10*d.* shows the balance at the bank: the two together, viz., £226 8*s.* 4*d.*, represent the total cash balance.

"Office Cheque, £15 0*s.* 0*d.*" This occurs on both sides of the account, and is thus explained:

The till has required replenishing, and so a cheque has been drawn for £15 and cashed. We have, therefore, to enter £15 in Col. No. 6, as paid out of the bank, and the same amount in Col. No. 2, as money received into the till.

The figures "18, 50, 1, 4," &c., represent the folios of the ledger to which the items are posted. There is no need to post the £15 office cheque anywhere, and so we simply put an × in the folio column on each side.

It is obvious that if we subtract the total of Col. 6 from the total of Col. 3, we find the amount of cash at the bank; while if we subtract the total of Col. 5 from the total of Col. 2, we find the sum there ought to be in the till.

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The Bought Journal.

This is a very useful, and in large offices an almost necessary, book. In it are entered all purchases made by the firm. Such a book, if ruled specially, will save a great many entries in the ledger. It will be found convenient to have it arranged so that the "faint" lines run without break from edge to edge across the fold, and to have columns ruled for: 1. Date. 2. Name of Vendor. 3. Ledger Folio. 4. Amount of Invoice. 5. Value of Machinery or Standing Plant included in the Invoice. 6. Value of Type included in the Invoice. 7. Value of Brass Rule, Leads, &c., in ditto. 8. Value of Consumable Material in ditto. 9. Various. That is to say, to have the usual date, name, and folio columns, and six money columns.

Suppose the printer to have given an "outfit" order to one of the general printers' furnishers, whom we will call "Smith and Co." The invoice, reaching a total of (say) £600, may contain items amounting to £400 for Machinery and Plant, £150 for Type, £20 for Brass Rule, Leads, Furniture, &c., £15 for Ink, and £15 for other consumable stores. The printer or his clerk will enter in the Bought Journal the date of the invoice (say Aug. 20, 1883), and the name "Smith and Co.," and in col. No. 4 (the first of the money columns) he will enter "£600 0*s.* 0*d.*" in the column for "Machinery," he will enter £400; in the column headed "Type," £150; and so on, until the whole £600 is disposed of.

When he buys his paper, say of "Jones and Co.," he will enter upon the next line of his Bought Journal the date of their invoice and their name, and, in col. No. 4, the total of their invoice—say £60—and the same amount in the column headed "Paper."

Day by day he will "post up" this Bought Journal, that is, he will make the appropriate entries in the Ledger. Thus he will, in the Ledger, open an account (say on folio 5) to "Smith and Co.," and in it he will, on the right-hand or credit side, write the words: "1883, Aug. 20. By Goods, B. J. 1, £600 0*s.* 0*d.*," and immediately afterwards will, in col. No. 3 of the Bought Journal, enter the figure "5," that being the folio of the Ledger on which "Smith and Co.'s" account is to be found. Then he will (say on folio 10 of the Ledger) open an account to "Jones and Co.," and will pursue precisely the same plan with regard to the item

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of £60 for paper. But he will as yet take no notice of columns Nos. 4 to 9 of the Bought Journal; he will wait until the end of the half-year, and then he will add up each of such columns and post the total of each to the debit side of its appropriate Impersonal account in the Ledger. Thus, assuming, for the sake of illustration, that he buys nothing more during the half-year, he will, in the Ledger account headed "Type," enter: "To Smith and Co., B. J. 1, £150," and in the Ink account he will enter: "To Smith and Co., B. J. 1, £15," and so on. Should he, however, have made several purchases of type and ink of various firms, he will not name these, but will enter in the Type account the total amount of the Type column of the Bought Journal, prefixing the words: "To sundry firms," and will do the like with the Ink account and all others of the same kind.

The Order Book

must be ruled with faint lines, and should be so carefully bound up that these run across the fold without break, for, unless the page be a very wide one, it will be necessary to continue each entry right across the opening. It should be ruled for columns headed: 1.—"Job No." 2.—"Date." 3.—"Name of Customer." 4.—"Address." 5.—"Description of Job." 6.—"When Wanted." 7.—"When Delivered." 8.—"Remarks."

The object of this book is explained by the headings of the various columns. It is a record of all the work done by the printer. The consecutive numbering of each job is most useful, as it serves to identify it in dockets and other papers where it is referred to. We give a specimen of an entry in this book:—

"253. Aug. 26. J. Brown. 18, High Street, Lincoln. 500 Business Cards, 2 colours. Aug. 27. Aug. 27. Parian cards supplied by customer."

The whole of this entry will be written in by the clerk in the counting-house when the order is received, except, of course, the date of delivery, which will be filled in when the goods are sent home. He will, in red ink or blue pencil, indorse conspicuously on the MS. the number "253," and then send it to the jobbing-room, with the proper instructions. The compositor on receiving it will look at his watch, and then proceed to set up the job. He will take note of all the time he is engaged on it, and when it is out of his hands he he will fill up one of his

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Dockets,

and annex a proof of the job to it.

The Compositors' Docket should be in the following form:—

COMPOSING ROOM.

*Name of Compositor*_____

*Job No.*_____ *Date*_____ 18

*Nature*_____

	Hours.	Minutes.	£	s.	d.
Setting					
„ .....*ens*...					
Proofing					
Correcting					
Total.....					

Remarks:

It is only the piece hands who will fill in the money value of the work: this they will, of course, do at the scale price, the figures representing the wages they have earned on the job. The money value of the time spent on it by the 'stab hands will be calculated in the counting-house.

The Machine Room Docket will be as follows:—

MACHINE ROOM.

*Name of Machine Minder*_____

*Job No.*_____ *Date*_____ 18

*Nature*_____

*Machine used*_____

*Paper used*_____ *r.*_____ *q.*_____ *s.*

*Ink used*_____

	Hours.	Minutes.
Making ready		
Proofs		
Working		
Total.....		

Remarks:

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There should also be Dockets for the Paper Warehouseman, showing the quantity, nature, and price of the paper or cards given out for each job, and Time Dockets for every other department, each workman entering up his own work and returning his Docket to the counting-house as soon as the job is out of his hands.

From these Dockets the pricing clerk will be able to make up the Cost Book, showing the cost of each job, and the Day Book, showing the charge made to the customer.

In small offices, where each operation is under the personal supervision of the proprietor of the concern, some, or perhaps all, of the Work Dockets may be dispensed with, the entries being made by him from memory straight into the Cost Book, which book may be made to embrace the Order Book and the Day Book too, thus considerably reducing the amount of book-keeping. But in large concerns a good system of Dockets is absolutely necessary, and it will be found desirable to have separate Order and Sale Books.

Besides the Job Dockets mentioned above, each workman in the establishment ought to render to the counting-house daily a *Time Sheet*, showing on what jobs he has been engaged and what time he has spent on each. These will constitute a valuable check upon the men in large offices, where they cannot be under the constant supervision of their employer. Here is the form of one:—

TIME SHEET.

*Date*_____

*Name of Workman*_____

*Room*_____

Job No.	WORK DONE.	Hrs.	Mins	Overtime. Hrs.	Mins
	Total.....				

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MACHINE MINDERS' TIME SHEET.

*Machine No.*_____

*Date*_____

	ON.	OFF.
Job		
No. or Sig. of Forme		
Job		
No. or Sig. of Forme		
Job		
No. or Sig. of Forme		
Minder		

		REAMS.
Reams done at 1 *o'clock*		
Done from 2 *till* 7 *or* 7.30.		
Done Overtime	HOURS WORKED.	
Total ...		

Accident or Stoppage, and Cause of ditto

*Overseer's Signature*_____

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A very useful Time Docket for piece hands in the composing-room has been devised by the overseer of one of the large London offices. It is as follows:—

*Name of Work*_____

*Name*_____

*Week Ending*_____ 18

Name of Article.	First Word.	Last Word.	Thousands of				
			Long Primer.	Bourg.	Brevier.	Minion.	Nonp.
		Total.....					

Lines. Hours.

.....*Long Primer*=.....

.....*Bourgeois* =.....

.....*Brevier* =.....

.....*Minion* =.....

.....*Nonpareil* =.....

Total...

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The Cost Book.

We have now to see that everything proper is charged to the customer, and a succinct record kept of the cost of each job executed in the establishment. In order that this may be done readily, and that no item of expense may be lost sight of, it is desirable to keep a *Cost Book*, printed and ruled according to the annexed plan :—

Name of Customer _____

No. _____ *Job Ordered* _____ 18 ____

„ *Invoiced* _____ 18 ____

Nature _____ *Day Book Folio* ____

	Time.	*Cost.*		
	H. M.	£	*s.*	*d.*
Paper or Cards				
Composition (day)				
„ *(night)*				
Distribution				
Reading				
Corrections				
Author's Corrections				
Proof Pulling				
Imposing				
Re-imposing				
Ruling				
Paging				
Binding				
Preparing Stereo				
Stereos or Electros				
Metal				
Machining (*Machine, No.* *)* ...				
„ „ ...				
„ „ ...				
Ink (black)				
„ *(coloured)*				
Bronze				
Dusting				
Folding				
Cutting and Parcelling				
Paid out				
Total Cost ... ... £				
Add				
Amount charged ... ... £				

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This book is, of course, kept in the counting-house, and is made use of only when a job is completed and has to be entered up. The clerk will have before him a print of the job itself, and the various dockets relating to it mentioned above. From these papers he will easily be able to fill in the proper prices against the various items. The compositor's docket will show that he spent so many hours on the job, and the clerk will know how much an hour that compositor earns. So with the machining: here he will have to calculate the cost, not only of the workman's labour and skill, but also of the ink and the value of the employment of the machine used. The paper warehouseman's docket will provide him with information as to the quantity and quality of the paper used, and furnished with this he will readily calculate the cost of it. Thus each item will be ascertained, and, by the simple process of addition, the total cost will be rapidly arrived at. Then has to be considered what should be added to provide for the proper proportion of motive-power and counting-house expenses, coals, gas, rent, rates and taxes, wear and tear of type, machinery, &c., and a fair profit for the master printer. Twenty-five per cent., or one-fourth of the total cost, is scarcely ever too much to add for this purpose, and many classes of work should be charged even more heavily. This being added, the final total gives the sum chargeable to the customer. This might be posted direct from the Cost Book to his account in the Ledger; but for various reasons, one of which we will mention directly, it is desirable to enter it first in a *Day Book*.

The Day Book

is an ordinary tradesman's book, such as is to be found in every retail and wholesale establishment, as well as in every merchant's office. It should be ruled with two money columns and a "folio column," besides a column for dates. At the top of each page should be written the name of the month and the year, and beneath are to be entered the names of the customers, and the nature and value of the work done for them, just as the same is invoiced. We append a sample page of the Day Book with specimen entries:—

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OCTOBER, 1883.

			£	*s.*	*d.*	£	*s.*	*d.*
	Brought forward ...					51	7	4
4	*E. Smith & Co.*, 240, *Oxford Street* ...	*18*						
	2,000 *Memorandum Heads c. ld.*, 8*vo*....	30						
				15	6			
	10,000 *Trade Cards* ...	31	3	17	0			
						4	12	6
5	*H. Jones*, 114, *North Road* ...	*50*						
	10,000 *Handbills*, "*Best Congou*" ...	32					16	6
	Forward					56	16	4

The figures 4 and 5 in the first column refer to the days of the month of October on which the goods were sent out; the other entries explain themselves, except the figures in the "folio column." Of these, the "18" and the "50" refer to the pages of the Ledger on which the accounts of Messrs. E. Smith & Co. and Mr. H. Jones are respectively to be found, and to the debit (or left hand) side of which the items are posted. The "30, 31, and 32" refer to the pages of the Cost Book from which these entries have been taken. Each page of the Day Book is added up and the amount carried forward until the end of the month, when the total for the month is posted to the *credit* side of the account in the Ledger, headed "Goods."

With the exception of a Bill Book in which to enter particulars of all Bills of Exchange given and taken by the firm, the above are all the books necessary for a printer to keep—and quite enough, too, we are ready to concede. It will be observed that we take no notice of the "Journal," so often referred to by Messrs. Hamilton and Ball. We do so advisedly; because, although it is useful in a merchant's system of book-keeping, it is a book which in most printing-offices may be dispensed with, and we will not urge the hard-working printer to keep any more accounts than are really necessary to enable him to determine his business position with accuracy.

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The Balance Sheet.

We have now to suppose that the printer has reached the end of his first working half-year, and is desirous of knowing what profit he has made and how the respective accounts of his liabilities and assets stand. We must assume that he has throughout the period kept a full and faithful record of all matters concerning his business in the books indicated in our previous articles: that he has kept separate accounts of—1. Buildings: 2. Rent, Rates, and Taxes; 3. Machinery and Standing Plant; 4. Type; 5. Brass Rule, Leads, and Furniture; 6. Consumable Material; 7. Wages; 8. Goods; and 9. Casual Expenses. The items under the heads numbered 3 to 6 will be in the Bought Journal, the prime entries of the Casual Expenses will be partly in the Bought Journal and partly in the Cash Book, and those for the work done and charged for will be found in the Day Book. The Dockets and Cost Book will not be required for the present purpose.

The first thing to be done is to ascertain how much consumable material is on hand. To do this the master printer should "take stock," that is, ascertain, by actual inspection, how much of each kind he has left. If he has kept warehouse books, the balances of these will show him how much of each article he has on hand. Take the "Ink Book:" if he has entered in the "Shilling Black" account every pound he has bought and every pound he has given out to his machine-minders, it is obvious that the balance will represent the quantity in stock; and so with the other kinds of inks, the coals, the paper, the roller composition, and so on. But even if such accounts have been kept, it is desirable to check them by taking stock, and to ascertain by counting, measuring, or weighing that the quantities shown by the accounts to be in stock actually are there.

Having, then, made a list of all consumable material on hand, the various items must be priced out, and the value of the whole ascertained by addition.

Now let us open in the Ledger, or if it is preferred, in a Private Ledger, an account headed "*Profit and Loss.*" Having done this, let us turn to the "Buildings" account in the Ledger. Here, on the debit side, will be found all sums spent or debts incurred in respect of repairs to premises during the half-year. (We shall assume our printer rents his premises and does not own them.) We add up these sums, insert the total, say £15, and on the credit side of the same account write "*By Profit and Loss*, £15 0*s.* 0*d.*," and

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then rule up the account. Now we turn to the Profit and Loss account, and on the debit side enter "*To Buildings*, £15 0*s.* 0*d.*" The next account to be dealt with is that of Rent, Rates, Taxes, &c. Here on the debit side will be found all outgoings on these heads, and on the credit side all incomings from the letting-off of part of the premises to sub-tenants (if any): the balance of the account will be the net expense, and the amount of it, say £80, must be dealt with in precisely the same way as the balance of the Buildings account.

Now we come to the Machinery and Standing Plant account. Here we have to do something different. On the debit side stands the total cost of machinery and plant of the office posted from the special column in the Bought Journal, say £800. This represents part of the printer's capital, but it is continually decreasing in value, owing to wear and tear. On the right-hand side of the account we must, therefore, write off a sum for depreciation during the half-year, say 3½ per cent. on the cost. This will be £28. Our entries will be as follows:—In the Machinery account we shall insert on the credit side, "*By Profit and Loss*, 3½ *per cent. for depreciation*, £28 0*s.* 0*d.*; *Balance carried down*, £772 0*s.* 0*d.*; *Total*, £800;" and, after ruling up, we shall write on the debit side, "*To Balance brought down*, £772 0*s.* 0*d.*" Turning to the Profit and Loss Account, we shall enter on the debit side, "*To depreciation of Machinery and Plant*, £28 0*s.* 0*d.*" The accounts headed "Type" and "Brass Rule, &c.," will be treated in precisely the same way, only the percentage to be written off will be larger (*see page* 609), and each time the amount written off must be entered on the debit side of the Profit and Loss account. Let us assume that the amount written off type is £12, that the amount written off brass rule, leads, furniture, &c., is £5, and that the balances of these accounts brought down (on the debit side) are respectively £188 and £20.

The account of Consumable Material will again be differently dealt with. Here on the debit side we find the total cost of all coals, paper, ink, composition, turps, and other consumable stuff bought during the half-year, and posted from the special column in the Bought Journal: say £505 17*s.* 6*d.* We next look at our stock sheet, and find the total value of all such things now on hand. This sum, say £237 11*s.* 4*d.*, we shall enter on the credit side of the Ledger account, thus: "*By Stock*, £237 11*s.* 4*d.*" The balance of the account will manifestly represent the value of what has been consumed during the period. This, amounting to

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£268 6*s.* 2*d.*, we shall transfer to the Profit and Loss account by crediting "Consumable Material," and debiting Profit and Loss with it. The Consumable Material account will then be ruled up, and the amount of stock carried down on the debit side, thus: "*To Stock, brought down*, £237 11*s.* 4*d.*"

The next accounts are those headed "Wages" and "Casual Expenses." There will seldom or never be anything on the credit side of these accounts, so the whole amounts—say £800 in one case and £35 in the other—will be transferred to Profit and Loss in the same way as has been done before.

Now we come to the "Goods" account. In this have been entered, on the credit side the total of the Day Book, *i.e.*, the amount of the work done by our printer and charged to his customers—say £1,500—and on the other side the value of work done for him by other tradesmen, such as the cost of woodcuts, of electros and stereos, of machining formes, of binding, &c., &c., say £45. The printer must now consider whether any portion of the things included in this account are available as his assets, and if so, what they are worth. For instance, if, for his own benefit, he has had electros taken of certain pages because he has a running contract to print so many copies a quarter, he may fairly look upon them as so much good property; but if he has had woodcuts engraved for his customers and has charged them with the cost, these are not his assets at all. We shall assume that he makes out a list of all such as are his own property, and that he values them at what they are really worth to him, say £15. This sum represents stock, and must be dealt with precisely as the stock of the consumable material was. The balance of Goods account will be carried to the credit side of "Profit and Loss," the account will be ruled up, and the £15 brought down as a balance on the debit side.

The Goods account will then stand thus:—

GOODS.

Credit side:—			
By Work done as per Day Book ...	£1,500	0	0
„ *Stock, carried down*	15	0	0
	£1,515	0	0
Debit side:—			
To Sundries as per Bought Journal...	£45	0	0
„ *Balance to Profit and Loss* ...	1,470	0	0
	£1,515	0	0
To Stock, brought down	£15	0	0

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We have now all the requisite items in our Profit and Loss account, and have only to balance the account to see what profit has been made during the half-year. The account will stand thus :—

PROFIT AND LOSS.

Credit side :—

By Goods	£1,470	0	0

Debit side :—

To Buildings	£15	0	0
„ *Rent, Rates, Gas, &c.*	80	0	0
„ *Depreciation of Machinery and Plant*	28	0	0
„ *Ditto of Type*	12	0	0
„ *Ditto of Brass Rule, Leads, &c.* ...	5	0	0
„ *Consumable Material used* ...	268	6	2
„ *Wages*	800	0	0
„ *Casual Expenses*	35	0	0
	£1,243	6	2
Balance (Profit)	226	13	10
	£1,470	0	0

If there be but one partner in the firm, this balance will not be brought down, but will be transferred to the account in the Ledger headed with his name, and entered there on the credit side. On this side also will have been already entered the amount of capital he brought into the business, and on the contrary side the sums he has, from time to time, drawn out. The balance of the account will show what his interest in the concern is at the end of the half-year in question.

If, however, there are two or more partners, the balance of the Profit and Loss account will be brought down (on the credit side), and on the debit side it will be apportioned to the partners in their proper shares, *e.g.* :—

To William Caxton, 2/3rds	£157	15	11
To W. De Worde, 1/3rd	78	17	11

And these sums respectively will be entered to the credit of the partners' separate accounts. The Profit and Loss account will then be ruled up again.

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As regards the making-up of a Balance Sheet, we must refer the reader to the work we have before mentioned, or, indeed, to any book on account-keeping. The following items will appear in the account:—

LIABILITIES:—

Sundry Creditors as per list	£	
(The total of all the firm's debts shown in the Ledger)		
Ditto on Bills Payable		
(The amount of all acceptances not yet paid)		
	£ (*a*)	
William Caxton		
(The balance of his a/c)		
W. De Worde		
(The balance of his a/c)		
	£ *x* + *y* + *z*	

ASSETS:—

Amounts due to the firm by sundry Debtors as per list	£			
Ditto on Bills Receivable				
Cash Balance				
	£ (*b*)			
Machinery and Plant		272	0	0
(The balance of the a/c so headed)				
Type (ditto)		188	0	0
Brass Rule, Leads, &c. (ditto) ...		20	0	0
Stock of consumable material, as per account		237	11	4
Stock of "Goods," as per account ...		15	0	0
	£ *x* + *y* + *z*			

(*a*) The amount entered here will be the sum total of the Creditors and Bills Payable.

(*b*) This amount will be the sum total of the three previous lines, and will represent the total assets available for the payment of the firm's trade liabilities, or, in other words, for payment of the sum entered at (*a*).

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It is to be remembered that if the books have been properly kept, the total of the debits will always be the same as the total of the credits, and therefore the Balance Sheet ought invariably to balance to a penny. This is explained at length by Hamilton and Ball.

We have now completed our task. Our system may not perhaps be the best that could possibly be devised, but it has the merit of being more simple and more easily followed than many which require the use of books ruled with a multitude of columns. One of these systems was divulged to us the other day. The main book kept was of immense size, and every horizontal line of it was divided by no less than 76 vertical ones, each creating a separate column. This book did little more than take the place of our Dockets and Cost Book, and we venture to think, without feeling guilty of much egotism, that for ordinary purposes the above plan is preferable. If this little treatise shall induce printers to keep their accounts with more method, and to ascertain periodically exactly what they have been doing and how they stand, it will be the means of infusing a healthier tone into a business which has of late years been far too much cut up by reckless estimating.

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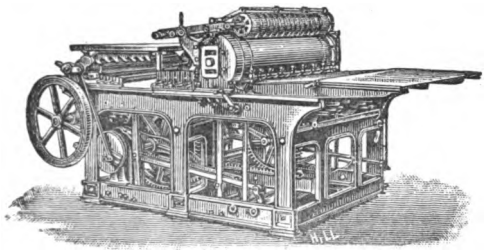

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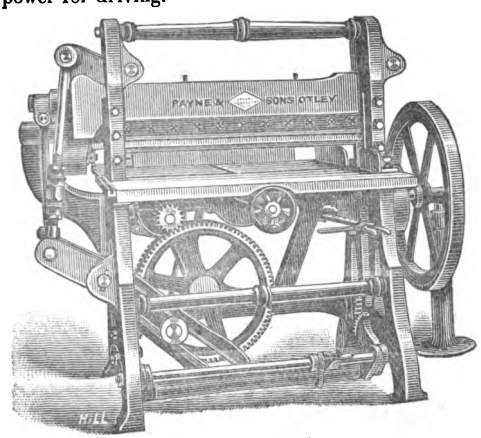

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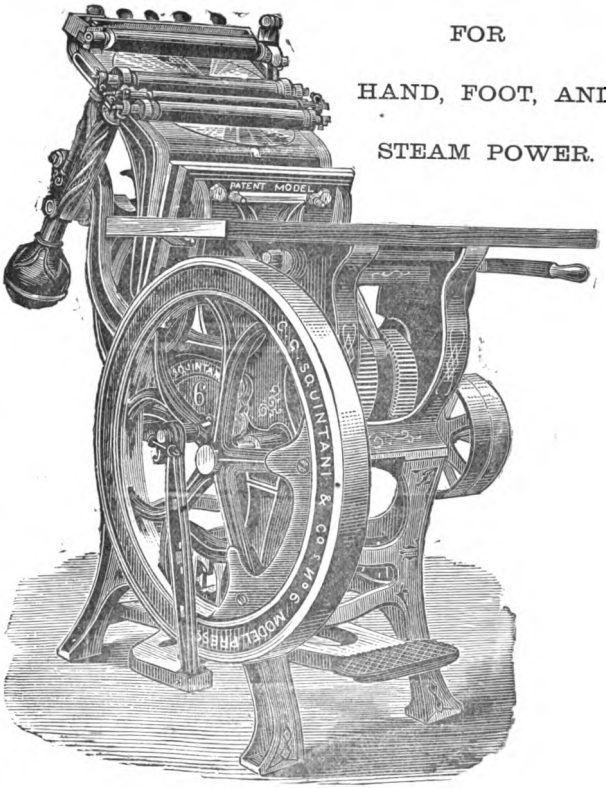

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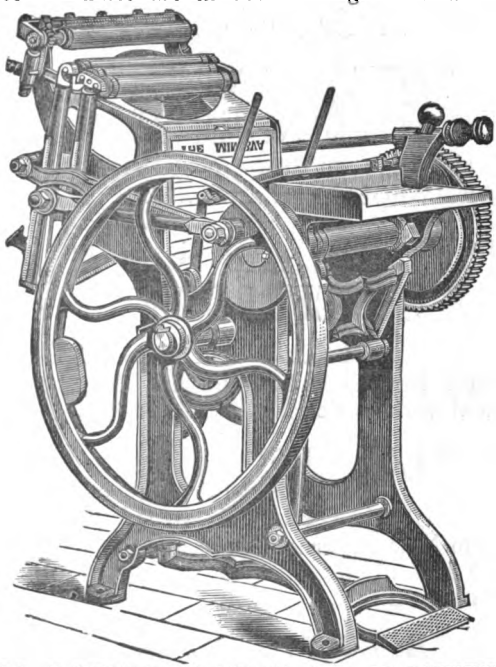

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